HEATHKIT® MANUAL

HEATH COMPANY • BENTON HARBOR, MICHIGAN

HEATH COMPANY PHONE DIRECTORY

The following telephone numbers are direct lines to the departments listed:

Kit orders and delivery information	(616) 982-3411
Credit	(616) 982-3561
Replacement Parts	(616) 982-3571

Technical Assistance Phone Numbers
8:00 A.M. to 12 P.M. and 1:00 P.M. to 4:30 P.M., EST, Weekdays Only

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Amateur Radio	(616) 982-3296
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Television	(616) 982-3307
Aircraft, Marine, Security, Scanners, Automotive, Appliances and General Products	(616) 982-3496
Computers	(616) 982-3309

YOUR HEATHKIT 90 DAY LIMITED WARRANTY

If you are not satisfied with our service - warranty or otherwise - or with our products, write directly to our Director of Customer Services, Heath Company, Benton Harbor, Michigan 49022. He will make certain your problems receive immediate, personal attention.

Our attorney, who happens to be quite a kitbuilder himself, insists that we describe our warranty using all the necessary legal phrases in order to comply with the new warranty regulations. Fine. Here they are:

For a period of ninety (90) days after purchase, Heath Company will replace or repair free of charge any parts that are defective either in materials or workmanship. You can obtain parts directly from Heath Company by writing us at the address below or by telephoning us at (616) 982-3571. And we'll pay shipping charges to get those parts to you — anywhere in the world.

We warrant that during the first ninety (90) days after purchase, our products, when correctly assembled, calibrated, adjusted and used in accordance with our printed instructions, will meet published specifications.

If a defective part or error in design has caused your Heathkit product to malfunction during the warranty period through no fault of yours, we will service it free upon proof of purchase and delivery at your expense to the Heath factory, any Heathkit Electronic Center (units of Schlumberger Products Corporation), or any of our authorized overseas distributors.

You will receive free consultation on any problem you might encounter in the assembly or use of your Heathkit product. Just drop us a line or give us a call. Sorry, we cannot accept collect calls.

Our warranty does not cover and we are not responsible for damage caused by the use of corrosive solder, defective tools, incorrect assembly, misuse, fire, or by unauthorized modifications to or uses of our products for purposes other than as advertised. Our warranty does not include reimbursement for customer assembly or set-up time.

This warranty covers only Heathkit products and is not extended to allied equipment or components used in conjunction with our products. **We are not responsible for incidental or consequential damages.** Some states do not allow the exclusion or limitation of incidental or consequential damages, so the above limitation or exclusion may not apply to you. This warranty gives you specific legal rights, and you may also have other rights which vary from state to state.

HEATH COMPANY
BENTON HARBOR, MI. 49022

Prices and specifications subject to change without notice.

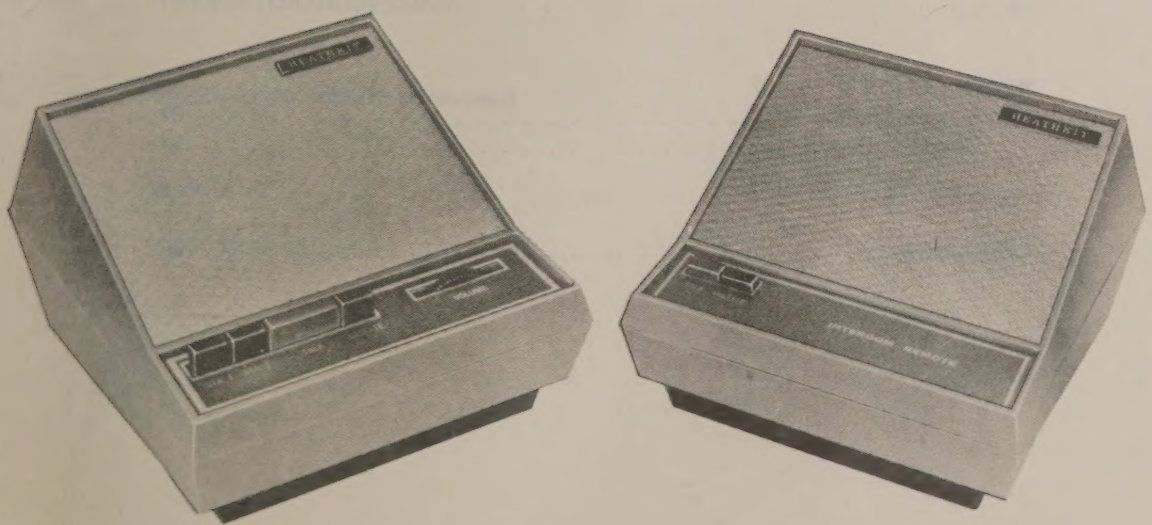
Heathkit® Manual

for the

TWO-STATION INTERCOM

Model GD-140

595-1324-02



HEATH COMPANY
BENTON HARBOR, MICHIGAN 49022

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INTRODUCTION

The Heathkit Model GD-140 Two-Station Intercom is a low-cost system designed expressly for limited applications. With the addition of an optional Model GD-120 Remote Intercom, the system can be expanded to its three-station capacity. In the home, the Intercom provides step-saving, room-to-room communications, babysitting monitoring, and other uses. In the office the system provides convenient paging, interoffice communications, or "hands-off" dictation.

The Master station was engineered to provide instant service without warmup delay. The unit draws less current than an electric clock, providing economical twenty-four hour service.

Either of the Remote Intercom stations can initiate calls to the Master station. However, the Intercom system provides true "private" communications and allows any station to maintain its privacy at all times unless otherwise desired. Either Remote can initiate calls to the Master if the Master TALK pushbutton is not depressed. In the same manner, the Master can select and call either or both Remote stations if the TALK pushbuttons on the Remotes are not depressed.

Each station has a 3" x 5" combination microphone-speaker which provides excellent sound reproduction. Plastic feet on the cabinet bottoms allow you to use the stations on a desk top, table, or shelf. Two optional mounting holes are provided in the bottom of each cabinet for wall-mounting if desired.

Modern low-silhouette styling with mist-green and silver colors make this unit an attractive addition to any surroundings.

Refer to the "Kit Builders Guide" for information on parts, tools, wiring, and soldering.

NOTE: We recommend that you order the necessary 4-conductor intercom cable from the Heath Company. (See the Parts List for the part number of the cable.) Be sure to determine your interstation needs carefully before ordering. To obtain the optional third station (a second remote station), refer to your Heathkit catalog and order Model GD-120 Remote Intercom.

PARTS LIST

Check each part against the following list. The key numbers correspond to the numbers on the Parts Pictorial (fold-out from Page 9).

To order a replacement part, use the Parts Order Form furnished with this kit. If a Parts Order Form is not available, refer to "Replacement Parts" inside the rear cover of the Manual. Your Warranty is located inside the front cover. For prices, refer to the separate "Heath Parts Price List."

If any parts are packaged in small envelopes with part numbers stamped on them, be sure to place the parts back in their proper envelopes until they are called for in a step.

KEY No.	PART No.	PARTS Per Kit	DESCRIPTION
RESISTORS			
1/2-Watt, 10%			
A1	1-41	1	10 Ω (brown-black-black)
A1	1-3	1	100 Ω (brown-black-brown)
A1	1-9	2	1000 Ω (brown-black-red)
A1	1-93	2	1800 Ω (brown-gray-red)
A1	1-13	2	2700 Ω (red-violet-red)
A1	1-16	1	4700 Ω (yellow-violet-red)
A1	1-121	1	120 kΩ (brown-red-yellow)
1/2-Watt, 5%			
A1	1-143	2	2.7 Ω (red-violet-gold-gold)
A1	6-331	3	330 Ω (orange-orange-brown-gold)
A1	1-105	2	10 kΩ (brown-black-orange-gold)
A1	1-109	1	12 kΩ (brown-red-orange-gold)
Resistors 1/2-watt, 5% (cont'd.)			
A1	1-50	2	68 kΩ (blue-gray-orange-gold)
A1	1-107	1	150 kΩ (brown-green-yellow-gold)
A1	1-77	2	390 kΩ (orange-white-yellow-gold)
CAPACITORS			
Electrolytic			
B1	25-54	1	10 μF
B1	25-145	1	25 μF
B2	25-194	1	100 μF vertical
B3	25-131	1	250 μF
B3	25-199	1	500 μF
Mylar*			
B4	27-68	1	.0033 μF
B4	27-74	1	.01 μF
B5	27-104	1	.0047 μF
B6	27-73	1	.047 μF
B6	27-47	2	.1 μF
B6	27-85	2	.22 μF
Other Capacitor			
B7	29-5	1	.001 μF (1000 pF) polystyrene

*Registered Trademark, DuPont Corporation

KEY No.	PART No.	PARTS Per Kit	DESCRIPTION
DIODES-TRANSISTORS			
C1	57-65	2	1N4002 diode
NOTE: Transistors are marked for identification in one of the following four ways:			
			1. Part number.
			2. Transistor type number.
			3. Part number and transistor type number.
			4. Part number with a transistor type number other than the one listed.
C2	417-91	2	2N5232A transistor
C2	417-94	1	2N3416 transistor
C2	417-118	1	2N3393 transistor
C2	417-201	2	X29A829 transistor
SWITCH-CONTROL-TRANSFORMER			
D1	64-56	1	2-button switch assembly
D2	64-76	1	4-button switch assembly
D3	10-364	1	50 kΩ control
D4	54-276	1	Power transformer
HARDWARE			
E1	250-186	4	#4 x 3/8" self-tapping screw
E2	250-8	6	#6 x 3/8" sheet metal screw
E3	250-89	1	6-32 x 3/8" screw
E4	250-1101	8	6-32 x 3/8" square head screw
E5	250-284	1	#6 x 1/2" screw
E6	250-347	4	#6 x 1" screw
E7	250-388	4	#6 x 1-1/2" screw
E8	252-3	9	6-32 nut
E9	253-60	1	Flat washer
E10	254-6	10	#6 lockwasher

KEY No.	PART No.	PARTS Per Kit	DESCRIPTION
PLASTIC PARTS			
F1	75-71	1	Strain relief
	75-90	1	Paper insulator
F2	75-138	8	Foot
F3	92-58	2	Cabinet top
F4	92-74	2	Cabinet bottom
F5	207-4	1	Large cable clamp
F6	207-5	1	Small cable clamp
MISCELLANEOUS			
	85-515-1	1	Amplifier circuit board
	85-516-1	1	Switchboard
	89-49	1	Line cord
G1	203-769	1	Remote trim panel
G2	203-810	1	Master trim panel
	209-65	2	Speaker grille
	344-99	1	White stranded wire
	344-55	1	Green wire
G3	401-162	2	Speaker
G4	431-4	1	3-lug terminal strip
G5	431-17	2	5-screw terminal strip
G6	462-211	1	Flat thumbwheel
	490-23	1	Allen wrench
	390-341	2	"Heathkit" nameplate
	390-979	1	Caution label
	391-34	1	Blue and white label
	597-260	1	Parts Order Form
	597-308	1	Kit Builders Guide
		1	Manual (See front cover for part number.)
			Solder

NOTE: Intercom cable, for between station wiring, is not supplied with this kit. See added information on the next page.

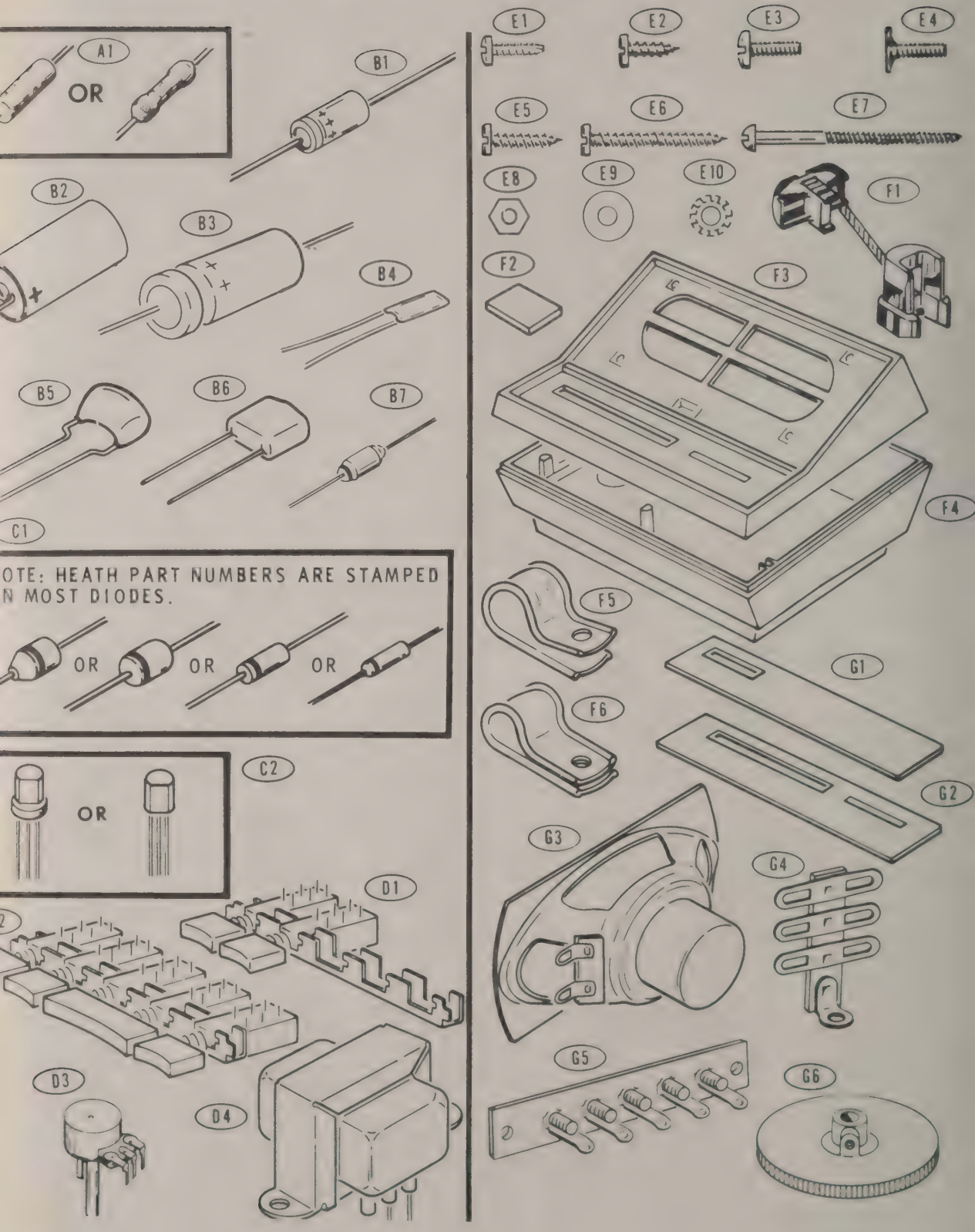
FOR CONNECTIONS BETWEEN STATIONS USE:

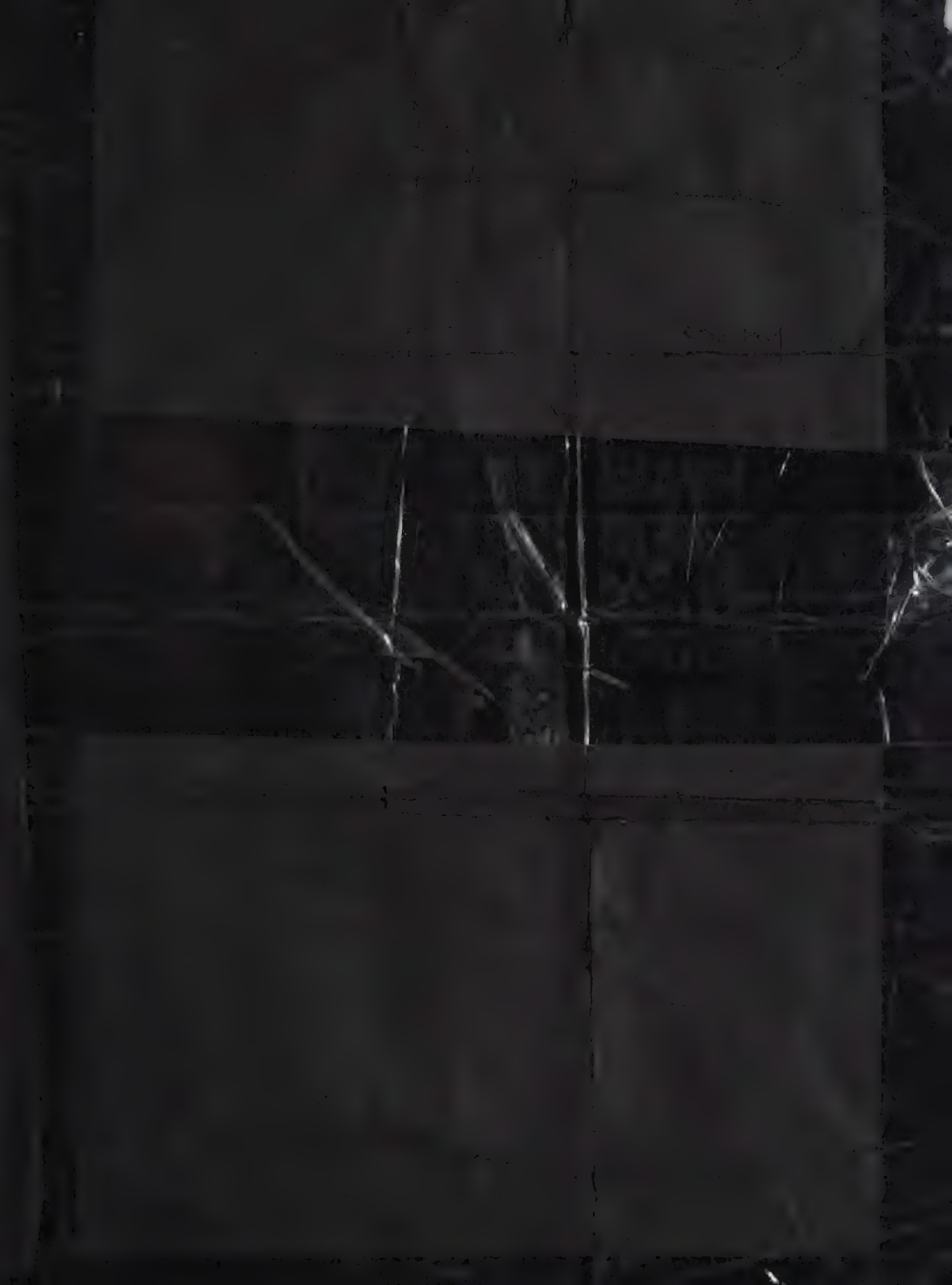
Four-wire cable between each Remote station, Model GD-120, and the Master.

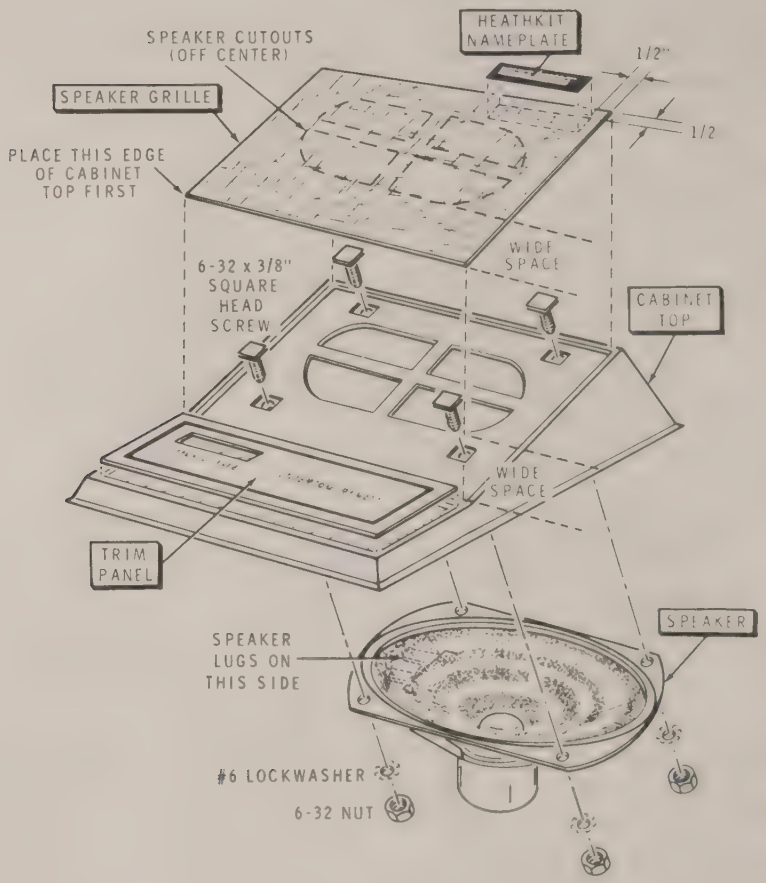
NOTE: Recommended 4-wire twisted intercom cable can be ordered from the Heath Company (see the following information). Cable can also be obtained from your local electronic supply store (use cable with the wires twisted approximately one turn per inch to minimize interference from sources outside the intercom system). Be sure to determine your interstation wire needs carefully before ordering. Refer to the "Installation" section of this Manual, Page 31.

Refer to the Heathkit catalog to order the following cable: Intercom Wire Pack Model GDA-110-2, 100 feet of 4-wire cable.

PARTS PICTORIAL






HEATHKIT NAMEPLATE
SPEAKER CUTOUTS (OFF CENTER)
1/2"
SPEAKER GRILLE
1/2
PLACE THIS EDGE OF CABINET TOP FIRST
WIDE SPACE
6-32 x 3/8" SQUARE HEAD SCREW
CABINET TOP
WIDE SPACE
TRIM PANEL
SPEAKER
SPEAKER LUGS ON THIS SIDE
#6 LOCKWASHER
6-32 NUT

PICTORIAL 1

STEP-BY-STEP ASSEMBLY

CABINET TOP ASSEMBLY

Before you start to assemble this kit, be sure you have read the wiring and soldering information in the "Kit Builders Guide."

Refer to Pictorial 1 for the following steps.

NOTE: You will assemble the Master and Remote Intercom cabinet tops in the following steps. Handle the speakers carefully to avoid puncturing the paper cone.

( ) Mount a speaker to one of the cabinet tops with four 6-32 x 3/8" square head screws, #6 lockwashers, and 6-32 nuts as shown.

NOTE: When you install a speaker grille as in the following step, observe that the cutout portion is not centered. Be sure the cutout is properly positioned over the cutout in the cabinet top.

( ) Carefully peel away the backing from a speaker grille. Press the grille into place on the front of the cabinet top. Do not press on the grille in the area of the speaker cutouts; the grille can be dented there.

( ) Remove the backing from the "Heathkit" nameplate. Press the nameplate into place on the speaker grille in the location shown.

( ) Locate the remote trim panel (#203-769, "Intercom Remote").

( ) Remove the thin covering from the front and the paper backing from the rear of the trim panel and carefully press the trim panel into place on the assembled cabinet top as shown in the Pictorial.

( ) Mount the remaining speaker to the other cabinet top with four 6-32 x 3/8" square head screws as shown in Pictorial 1.

( ) Carefully peel away the backing from the remaining grille. Press the grille into place on the front of the cabinet top. NOTE: Do not press on the grille in the area of the speaker cutouts; the grille can be dented there.

( ) Remove the backing from the "Heathkit" nameplate. Press the nameplate into place on the grille in the location shown.

( ) Locate the master trim panel (#203-810).

( ) Remove the thin covering from the front and the paper backing from the rear of the trim panel and carefully press the trim panel into place on the cabinet top as shown in the Pictorial.

Set the remote and master cabinet tops aside temporarily.

REMOTE CABINET BOTTOM

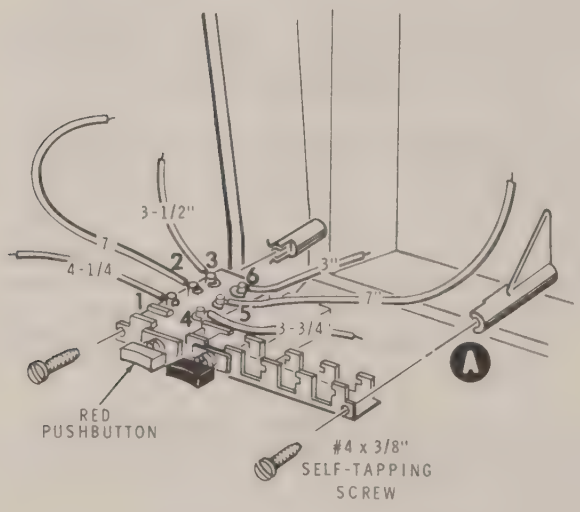
Refer to Pictorial 2 for the following steps.

NOTE: In the following steps you will assemble the remote cabinet bottom. Use either of the two cabinet bottoms supplied with this kit (#92-74).

( ) Use a drill, a reamer, a small knife, or other sharp tool and cut through the wire entrance hole at location C.

( ) Cut the following lengths of green wire. Then prepare each wire by removing 1/4" of insulation from each end.

3-1/2"	7"
3"	4-1/4"
7"	3-3/4"



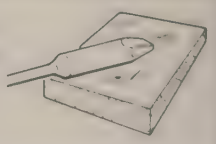
Detail 2A

Refer to Detail 2A for the following steps.

( ) Position the 2-button switch assembly on your work area as shown. NOTE: The screws will be installed later.

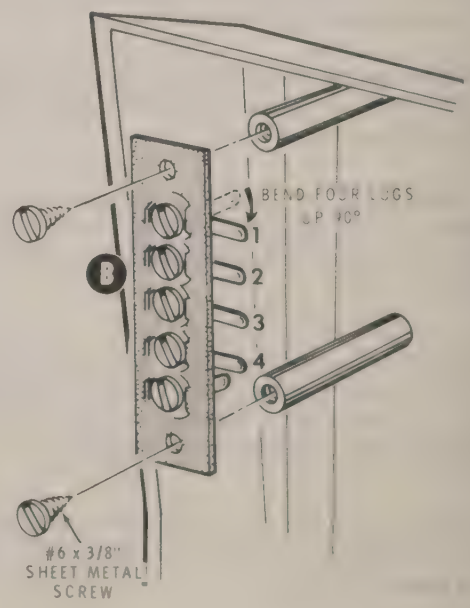
FOR GOOD SOLDER CONNECTIONS, YOU MUST KEEP THE SOLDERING IRON TIP CLEAN...

WIPE IT OFTEN WITH A DAMP SPONGE OR CLOTH.

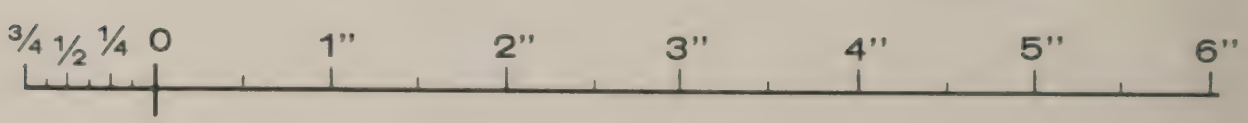


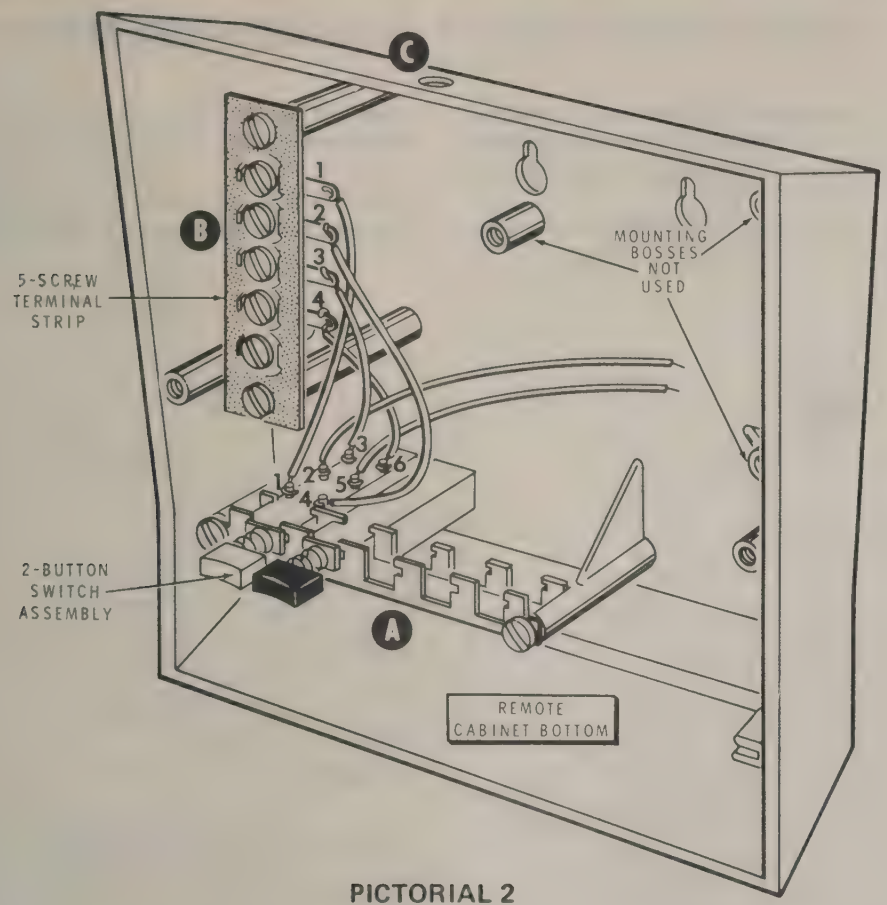
Form a hook in one end of each of the wires and connect them, as follows, to the pins of the 2-button switch assembly. The other ends of the wires will be connected later. NOTE: Only the red pushbutton switch will be wired in the following steps.

WIRE	TO SWITCH PIN
( ) 3-1/2"	#3 (S-1).
( ) 3"	#6 (S-1).
( ) 7"	#2 (S-1).
( ) 7"	#5 (S-1).
( ) 4-1/4"	#1 (S-1).
( ) 3-3/4"	#4 (S-1).



Detail 2B





PICTORIAL 2

NOTE: The three short mounting bosses shown in Pictorial 2 in the cabinet bottom are not used.

( ) Position the 2-button switch assembly at location A over the mounting bosses as shown. Then install the assembly with two #4 x 3/8" self-tapping screws. NOTE: Start the screws into the switch assembly, before you install the assembly into the cabinet.

Refer to Detail 2B for the following steps.

( ) Bend four lugs of the 5-screw terminal strip up 90 degrees so they are parallel to the fiber portion of the terminal strip as shown. NOTE: Lug 5 of this terminal strip will not be used.

( ) Install the 5-screw terminal strip on the mounting bosses at B with two #6 x 3/8" sheet metal screws.

Connect the wires coming from switch assembly pins 1, 4, 3, and 6 to the 5-screw terminal strip in the following manner as shown in the Pictorial. The wires from pins 2 and 5 will be connected later.

	CONNECT THE WIRE FROM SWITCH PIN	TO TERMINAL STRIP LUG
( )	#1	#1 (S-1).
( )	#4	#2 (S-1).
( )	#3	#3 (S-1).
( )	#6	#4 (S-1).

Set the Remote Intercom aside temporarily.

AMPLIFIER CIRCUIT BOARD ASSEMBLY

You will install components on the circuit board in Pictorials 3 through 10. Follow the instructions carefully and read the entire step before performing each operation.

All resistors will be called out by resistance values (in Ω or kΩ) and the color code will be given for all resistors.

Capacitors will be called out by capacitance value in μF (microfarads) and type (electrolytic, Mylar, or polystyrene).

NOTE: Position the amplifier circuit board as shown in Pictorial 3 and proceed with the following steps.

START

NOTE: Position the amplifier circuit board as shown in this Pictorial. Then perform the following steps.

FOR GOOD SOLDERED CONNECTIONS, YOU MUST KEEP THE SOLDERING IRON TIP CLEAN. WIPE IT OFTEN WITH A DAMP SPONGE OR CLOTH

( ) 1800 Ω (brown-gray-red).

( ) 330 Ω, 5% (orange-orange-brown-gold).

( ) 2.7 Ω, 5% (red-violet-gold-gold).

( ) 4700 Ω (yellow-violet-red).

( ) 2700 Ω (red-violet-red).

( ) 1000 Ω (brown-black-red).

( ) 2700 Ω (red-violet-red).

( ) Solder the leads to the foil and cut off the excess lead lengths.

( ) 10 kΩ, 5% (brown-black-orange-gold).

( ) 68 kΩ, 5% (blue-gray-orange-gold).

( ) 390 kΩ, 5% (orange-white-yellow-gold).

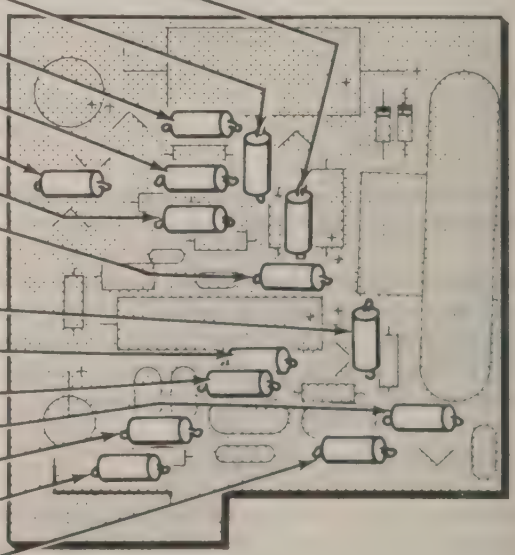
( ) 68 kΩ, 5% (blue-gray-orange-gold).

( ) 330 Ω, 5% (orange-orange-brown-gold).

( ) 100 Ω (brown-black-brown).

( ) 390 kΩ, 5% (orange-white-yellow-gold).

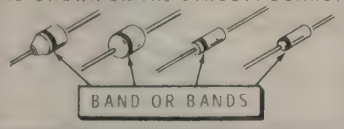
( ) Solder the leads to the foil and cut off the excess lead lengths.



PICTORIAL 3

START

NOTE: DIODES MAY BE SUPPLIED IN ANY OF THE FOLLOWING SHAPES. ALWAYS POSITION THE BANDED END AS SHOWN ON THE CIRCUIT BOARD.



( ) 1N4002 diode (#57-65) at D2.

( ) 1N4002 diode (#57-65) at D1.

( ) 2.7 Ω, 5% (red-violet-gold-gold).

( ) 1800 Ω (brown-gray-red).

( ) 150 kΩ, 5% (brown-green-yellow-gold).

( ) 120 kΩ (brown-red-yellow).

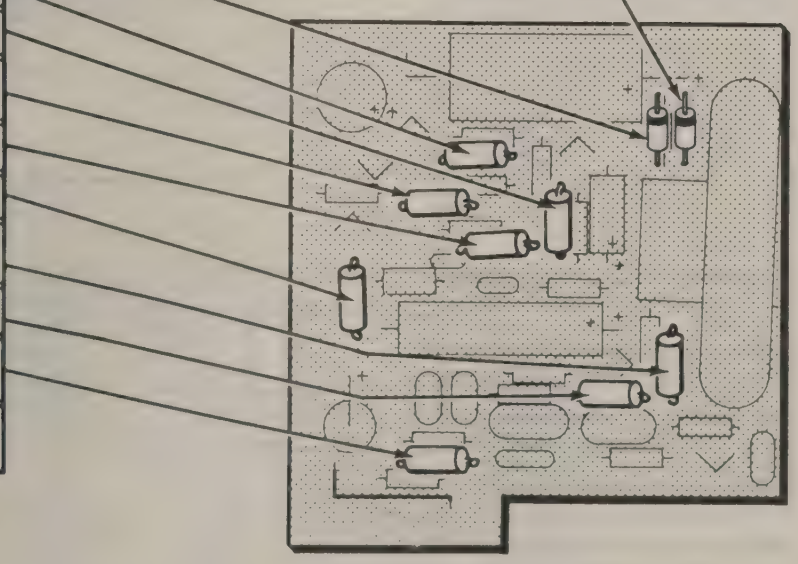
( ) 10 Ω (brown-black-black).

( ) 10 kΩ, 5% (brown-black-orange-gold).

( ) 12 kΩ, 5% (brown-red-orange-gold).

( ) 330 Ω, 5% (orange-orange-brown-gold).

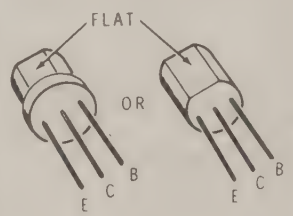
( ) Solder the leads to the foil and cut off the excess lead lengths.



PICTORIAL 4

START

NOTE: You will install six transistors in the following steps. These transistors may be supplied in either of the following shapes. Study the drawing carefully and identify each lead of the transistor; then install the transistor on the circuit board. Position the E lead into the E hole, the C lead into the C hole, and the B lead into the B hole. Finally, solder all three leads of each transistor as it is installed and cut off the excess lead lengths. See Detail 5A.



( ) 2N3393 transistor (#417-118) at Q4.

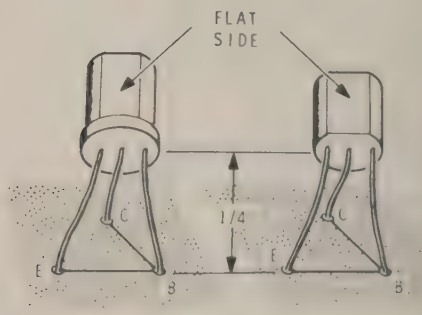
( ) X29A829 transistor (#417-201) at Q3.

( ) X29A829 transistor (#417-201) at Q5.

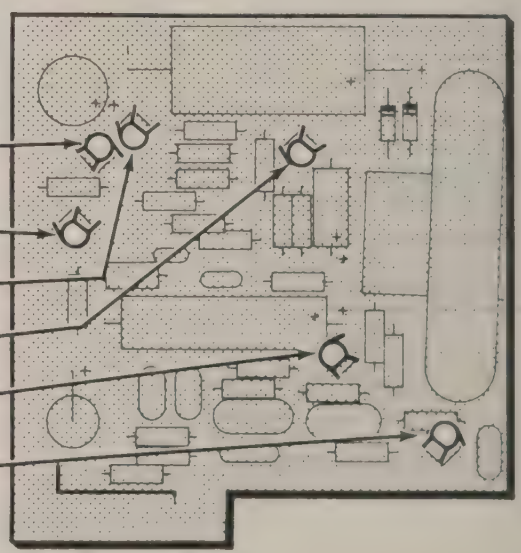
( ) 2N3416 transistor (#417-94) at Q6.

( ) 2N5232A transistor (#417-91) at Q1.

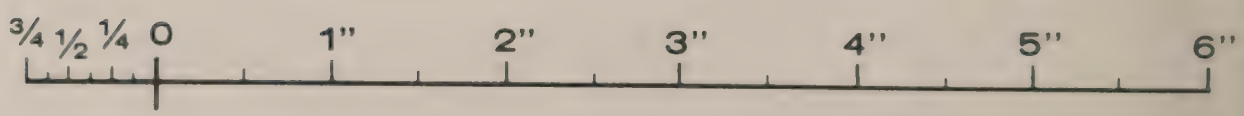
( ) 2N5232A transistor (#417-91) at Q2.



Detail 5A



PICTORIAL 5



START

( ) .0033 µF Mylar.

( ) 1000 pF polystyrene.

( ) .01 µF Mylar.

( ) .1 µF Mylar.

( ) .1 µF Mylar.

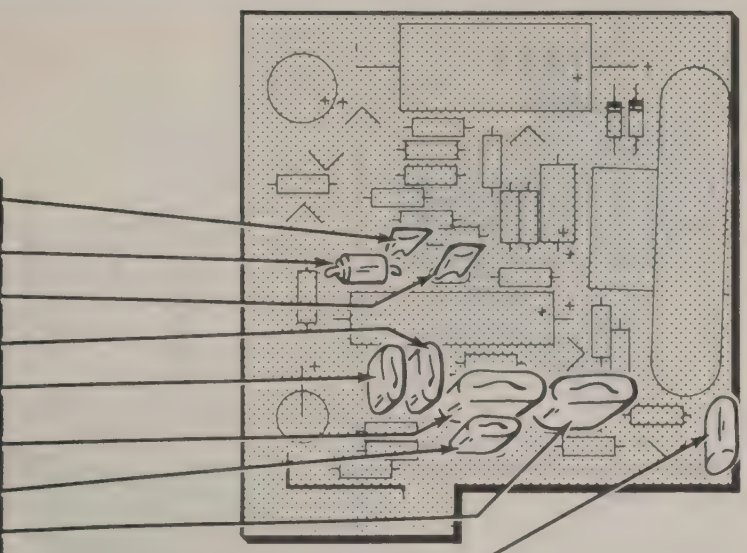
( ) .22 µF Mylar.

( ) .047 µF Mylar.

( ) .22 µF Mylar.

( ) .0047 µF Mylar.

( ) Solder the leads to the foil and cut off the excess lead lengths.



PICTORIAL 6

START

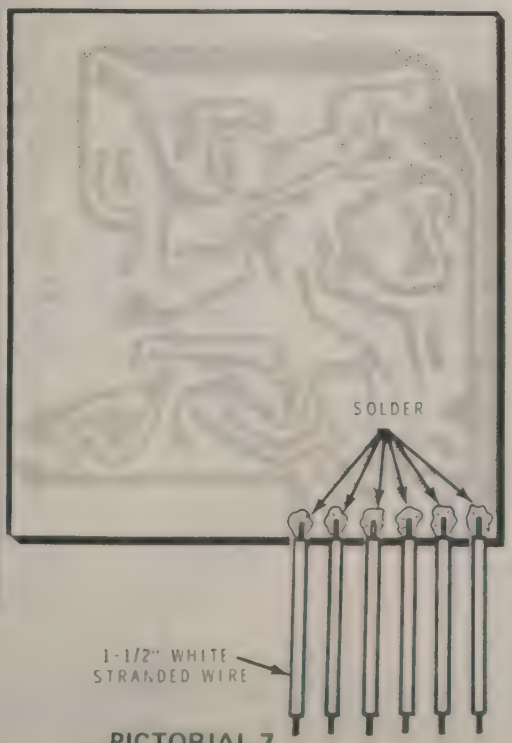
Position the amplifier circuit board foil side up as shown.

( ) Melt a generous amount of solder onto each of the six indicated circuit board foils.

( ) Prepare six 1-1/2" lengths of white stranded wire as follows: Remove 1/4" of insulation from each wire end; then twist the wire ends tightly. Apply a small amount of solder to each wire end to hold the small strands together.

( ) Install each of the six 1-1/2" white stranded wires in the following manner:

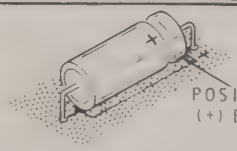
1. Heat the solder connection with the soldering iron until the solder is melted.
2. Place one end of a white stranded wire in the melted solder as shown in the Pictorial.
3. Remove the soldering iron from the connection; hold the wire steady until the solder cools.



PICTORIAL 7

START

NOTE: When you install electrolytic capacitors as in the following steps, be sure the positive (+) lead of the capacitor goes into the positive (+) marked hole on the circuit board.



( ) 500 μF electrolytic (#25-199).

( ) 100 μF vertical electrolytic (#25-194).

( ) 10 μF electrolytic (#25-54).

( ) 250 μF electrolytic (#25-131).

( ) 25 μF electrolytic (#25-145).

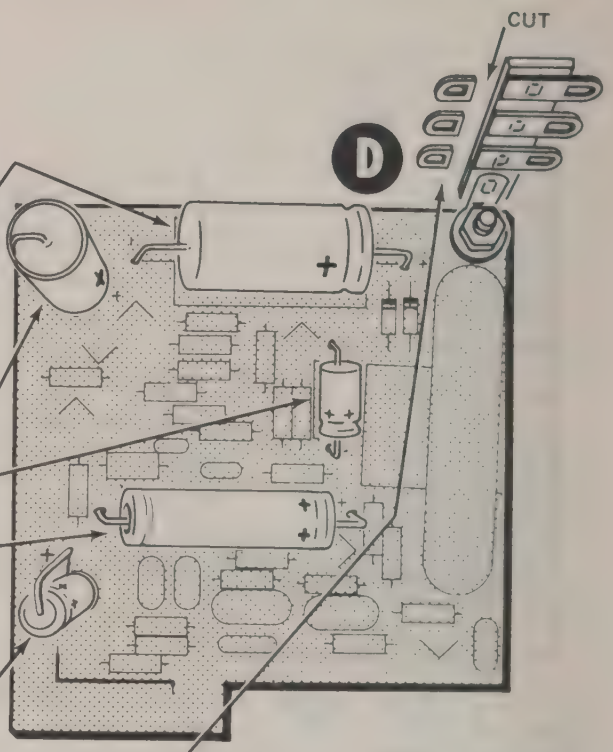
( ) Solder the leads to the foil and cut off the excess lead lengths.

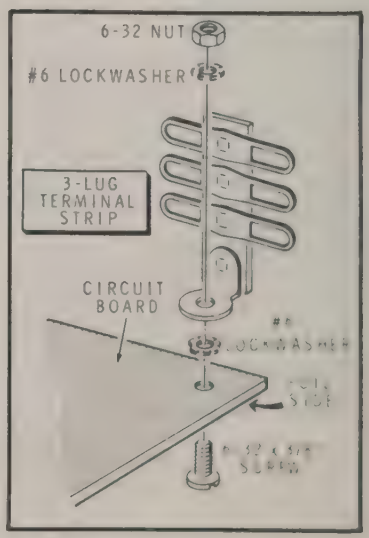
( ) Refer to Detail 8A and install a 3-lug terminal strip at D with a 6-32 x 3/8" screw, two #6 lockwashers and a 6-32 nut. Position the terminal strip as shown in the Pictorial.

( ) Cut off the three lugs nearest the 500 μF capacitor as shown.

FOR GOOD SOLDERED CONNECTIONS, YOU MUST KEEP THE SOLDERING IRON TIP CLEAN

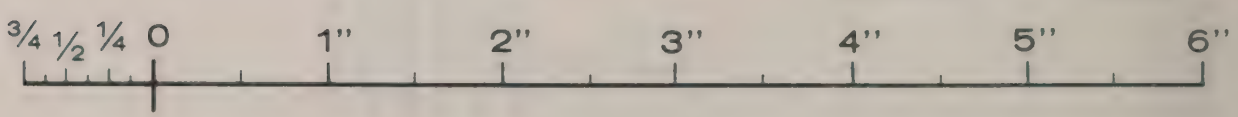
WIPE IT OFTEN WITH A DAMP SPONGE OR CLOTH





PICTORIAL 8

Detail 8A



START

NOTE: When you are instructed to prepare a wire, as in the following step, cut the wire to the indicated length and remove 1/4" of insulation from each end.

( ) Prepare a 3-3/4" green wire.

( ) Install one end of this wire in the hole marked LUG 3 and solder it to the foil. Cut off the excess wire length. The free end will be connected later.

( ) Install the power transformer by pushing the three short leads through the indicated holes in the circuit board. Solder the leads to the foil and cut off the excess lead lengths.

CAUTION: Handle the circuit board very carefully until it is installed in the cabinet; the transformer will be held onto the board only by the short leads.

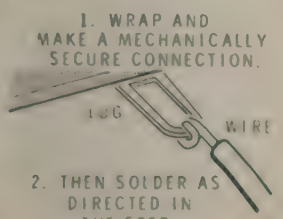
( ) Prepare a 1-1/2" green wire.

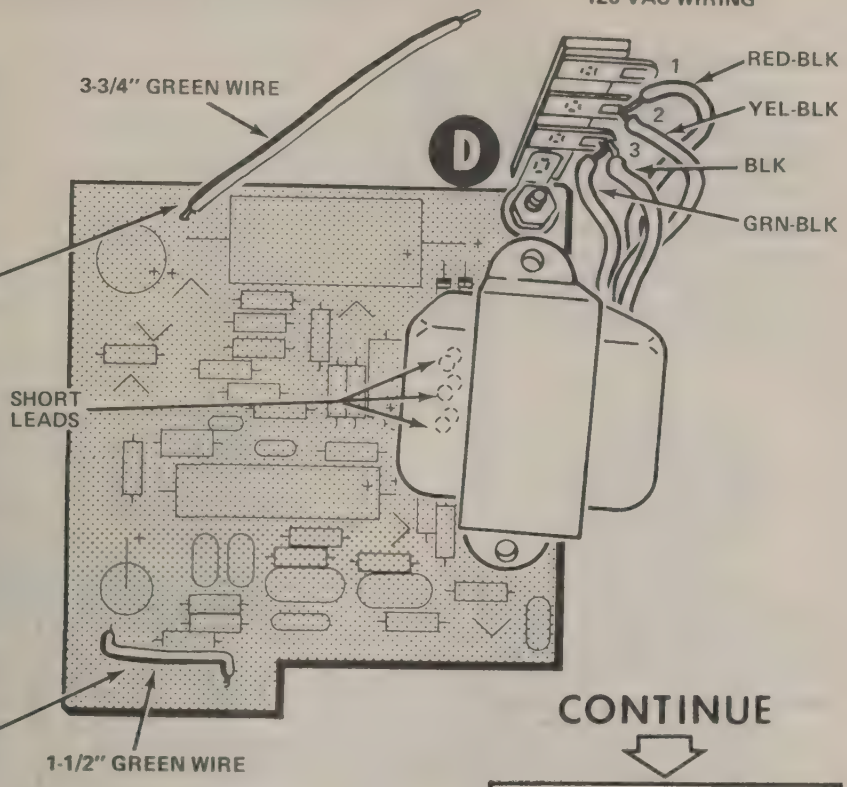
( ) 1-1/2" green wire at J. Shape this wire to the outline on the circuit board. Solder the ends to the foil and cut off any excess wire lengths.

ALTERNATE LINE VOLTAGE WIRING

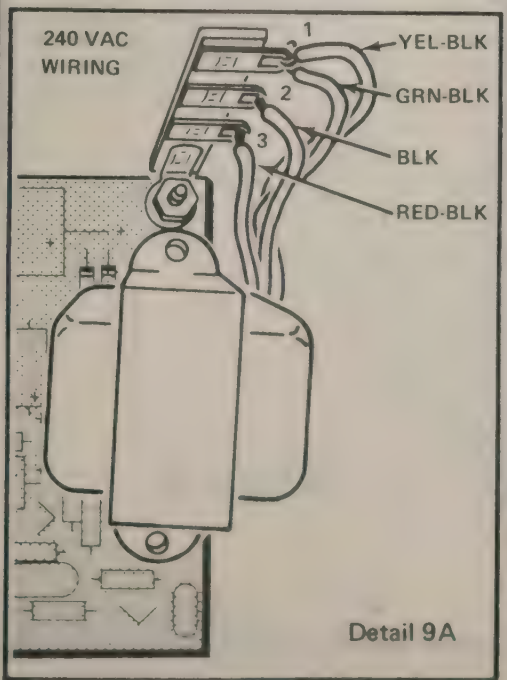
Two sets of wiring instructions follow, one for 120 Vac line voltage and the other for 240 Vac line voltage. In the U.S.A. 120 Vac is most often used, while in many other countries 240 Vac is most common. USE ONLY THE INSTRUCTIONS THAT AGREE WITH THE LINE VOLTAGE IN YOUR AREA.

NOTE: In the following steps, be sure to make mechanically secure connections. Do this by inserting the wire through and/or wrapping it around the lug before soldering.





PICTORIAL 9



CONTINUE

120 Vac Wiring

( ) Connect the black and green-black transformer leads to lug 3 of terminal strip D (NS).

( ) Connect the yellow-black and red-black transformer leads to lug 2 of terminal strip D (NS).

240 Vac Wiring

Refer to Detail 9A for the following steps.

( ) Connect the red-black transformer lead to lug 3 of terminal strip D (NS).

( ) Connect the black transformer lead to lug 2 of terminal strip D (NS).

( ) Connect the yellow-black and green-black transformer leads to lug 1 of terminal strip D (S-2).

( ) Carefully inspect the foil side of the circuit board to be sure there are no solder bridges between foils.

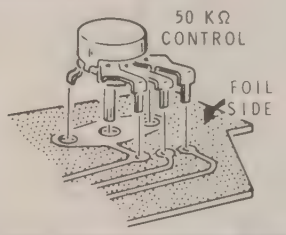
Set the amplifier circuit board aside temporarily.

SWITCHBOARD ASSEMBLY

START

Position the switchboard as shown in the Pictorial. Then proceed with the following steps.

NOTE: You will install the 50 kΩ control in the following step. Mount it through the circuit board from the foil side. The control shaft will extend upward from the lettered side of the board.



( ) 50 kΩ control (#10-364). Solder the three control leads and both side tabs to the foil.

( ) 1000 Ω resistor (brown-black-red). Solder the leads to the foil and cut off the excess lead lengths. Be sure this resistor is tight against the board.

( ) Prepare the following lengths of green wire.

3-3/4"	7"
7"	4-1/4"
3-1/4"	4-1/2"

NOTE: As you install each wire in the following steps, solder the wire to the foil and cut off the excess wire length. The free end will be connected later.

( ) 3-3/4" wire at LUG 4.

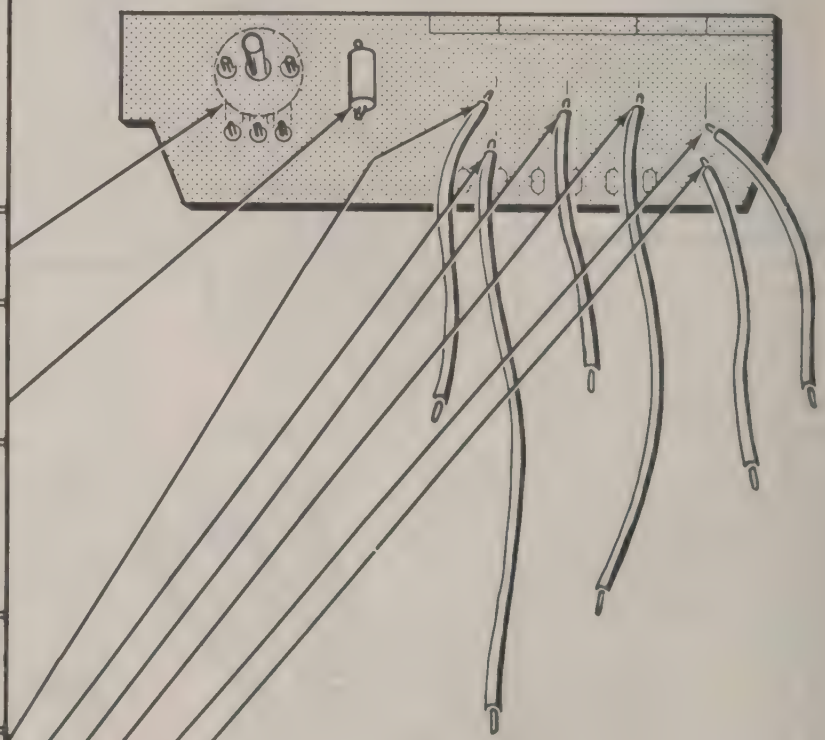
( ) 7" wire at SPKR 2.

( ) 3-1/4" wire at LUG 5.

( ) 7" wire at SPKR 1.

( ) 4-1/4" wire at LUG 1.

( ) 4-1/2" wire at LUG 2.



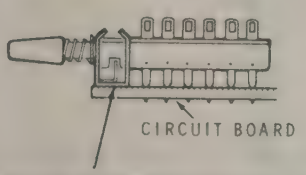
PICTORIAL 10

START

In the following steps, you will install the 4-button switch assembly on the switch-board. Be sure to mount the switch assembly exactly as directed.

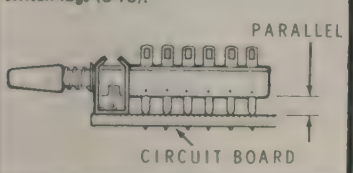
( ) Locate the 4-button switch assembly (#64-76).

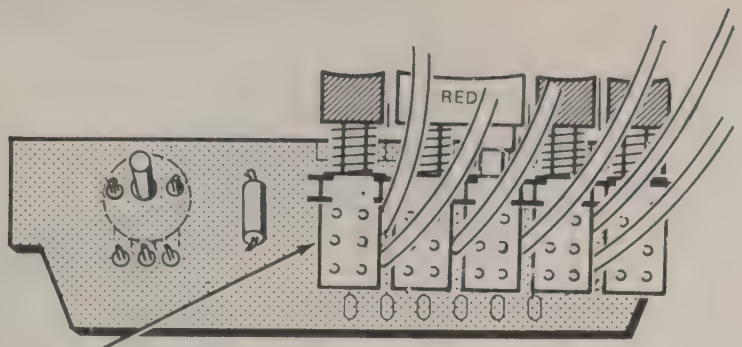
( ) Install the switch assembly on the component side of the circuit board. Carefully insert all of the switch lugs in their mounting holes. Then push the assembly onto the circuit board alternately pressing each switch.



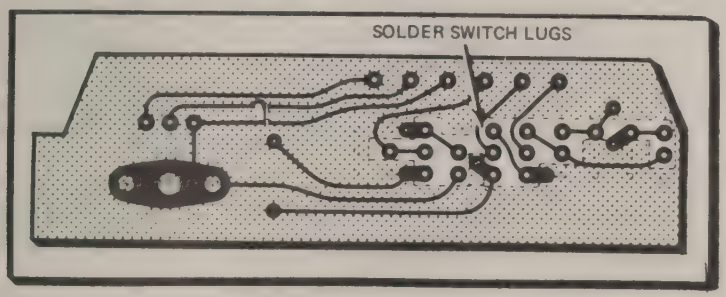
Make sure the switch mounting bar is against the circuit board along its entire length.

Also, make sure the assembly is parallel with the circuit board. Then turn the assembly over and solder two lugs on each end of the switch assembly. Check the switch assembly to make sure it is straight. If the assembly is straight, solder the other switch lugs (S-16).



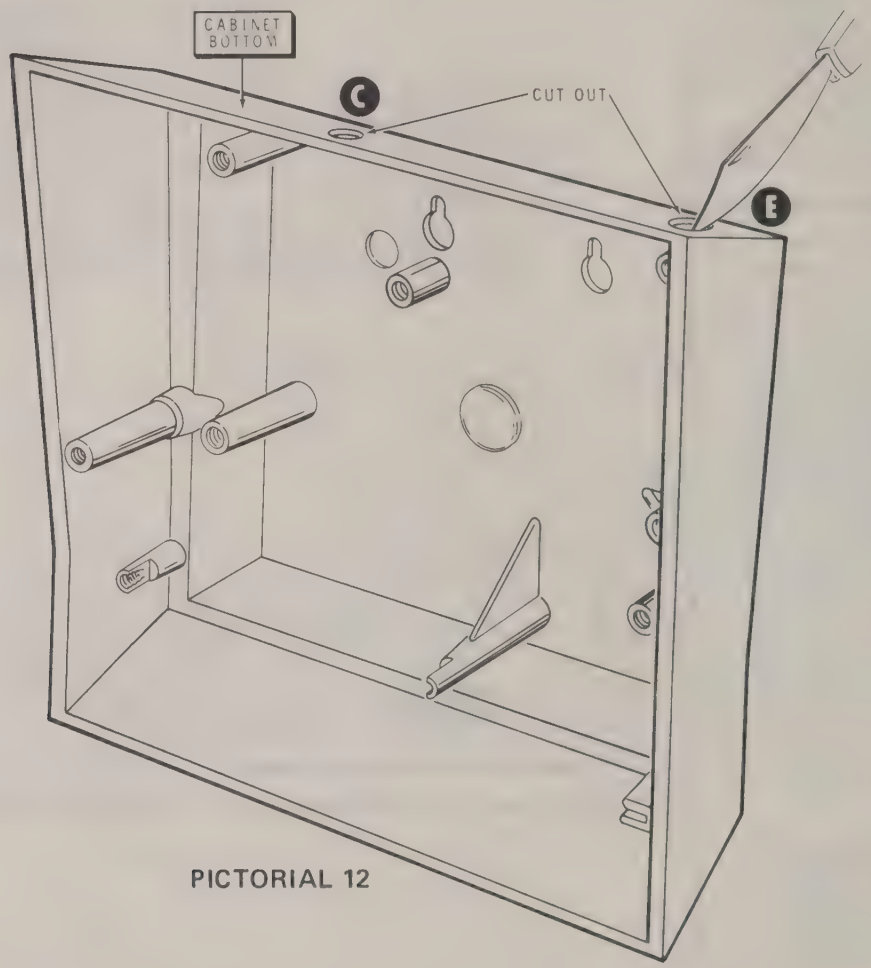


PICTORIAL 11



Detail 11A

COMBINED ASSEMBLY



PICTORIAL 12

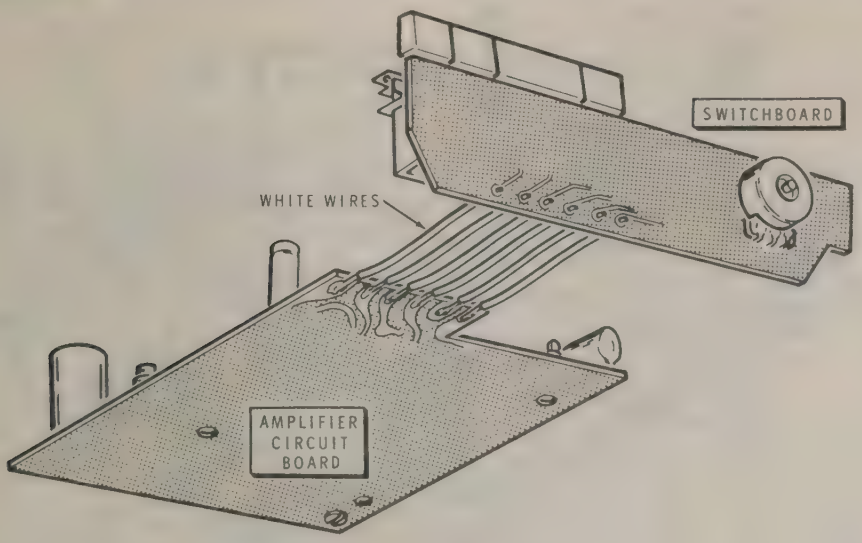
Refer to Pictorial 12 for the following steps.

( ) Locate the remaining cabinet bottom (#92-74).

( ) Remove the strain relief plug at E with a drill, a reamer, a knife, or other sharp tool.

( ) In the same manner, remove the cable plug at C with a sharp tool.

Refer to Pictorial 13 (fold-out from Page 23) for the following steps.



Detail 13A

( ) Refer to Detail 13A and position the six white stranded wires straight out from the amplifier circuit board as shown.

( ) Lay the amplifier on the work area, foil side down.

( ) Position the component side of the switchboard close to the amplifier circuit board as shown in the Detail, so the six white wires line up with the six holes in the bottom of the switchboard.

NOTE: In the following steps, be sure none of the white wires become crossed. They must go straight from one circuit board to the other. The wires will be installed moving right to left.

( ) Locate the white stranded wire at the right corner of the amplifier board. Push the free end of this wire through the hole in the lower right edge of the switchboard (S-1).

( ) In the same manner, install the second wire into the second hole of the switchboard (S-1).

( ) Install the third wire into the third hole (S-1).

( ) Install the fourth wire into the fourth hole (S-1).

( ) Install the fifth wire into the fifth hole (S-1).

( ) Install the last wire into the last hole (S-1).

( ) Cut off any excess wire ends.

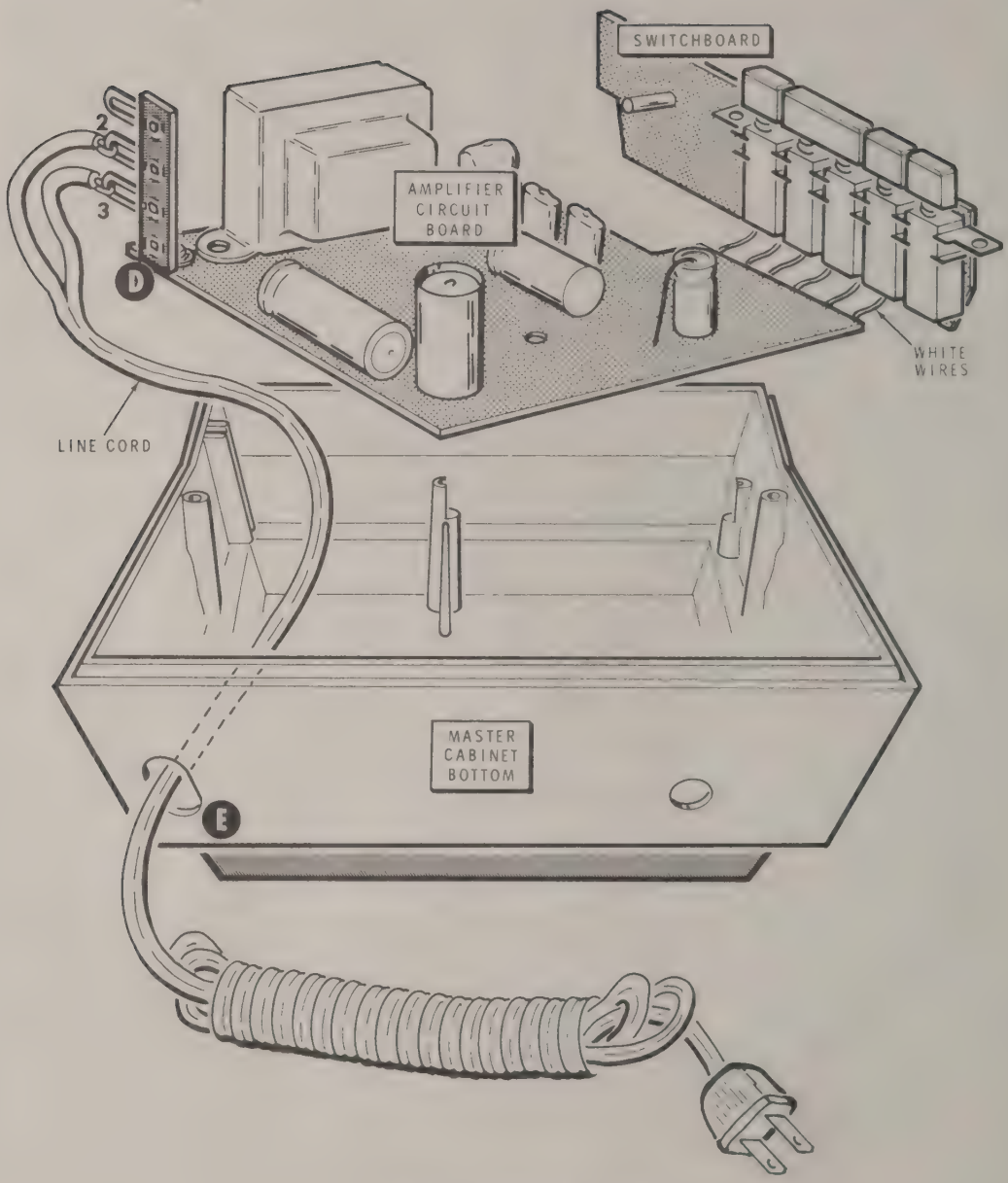
( ) Locate the line cord.

( ) Tightly twist the bare wire ends of the line cord; then apply a small amount of solder to each end to hold the small strands together. Use enough solder to coat each bare wire completely.

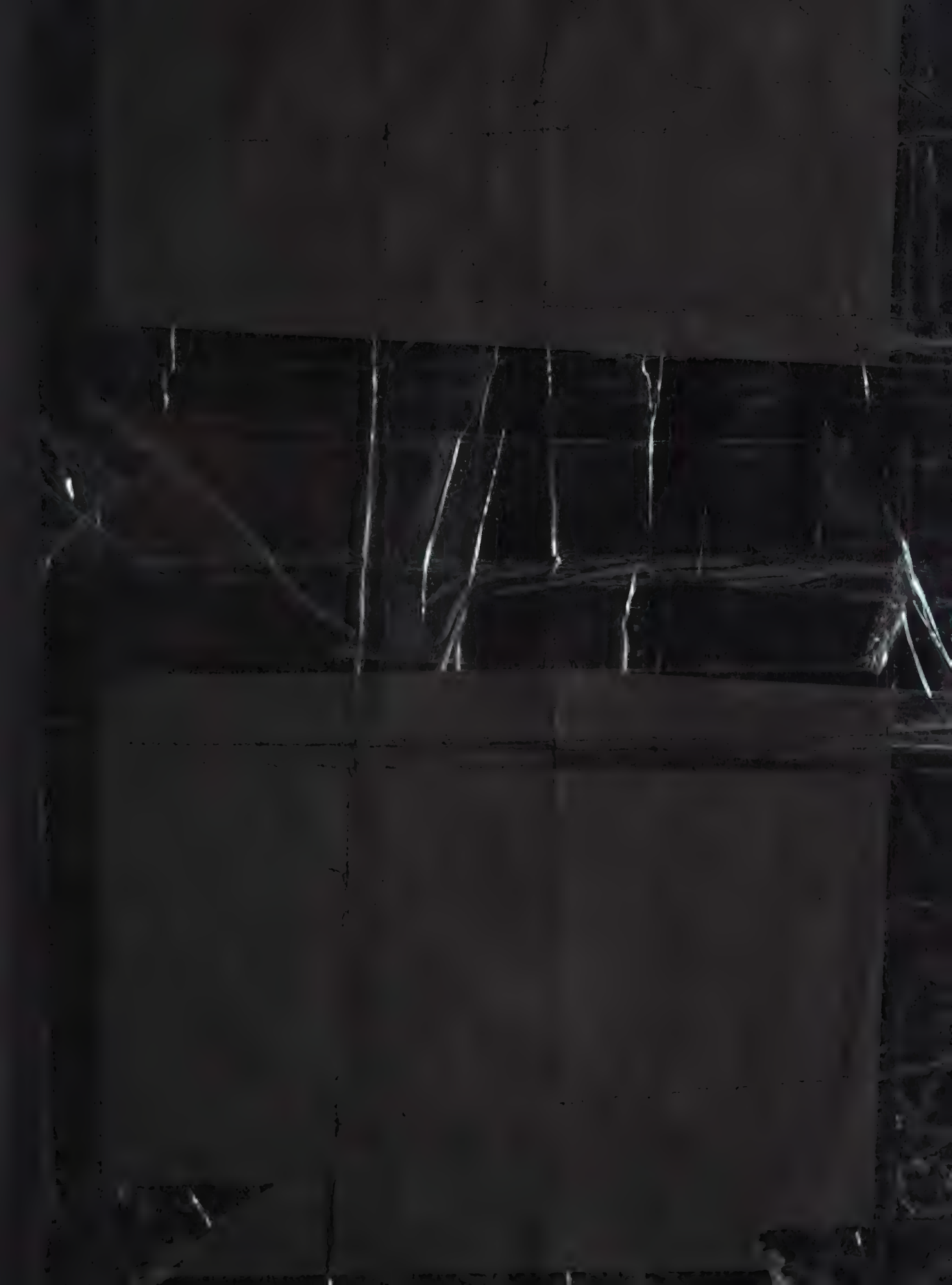
( ) Pass the end of the line cord through hole E in the rear of the master cabinet bottom as shown in the Pictorial.

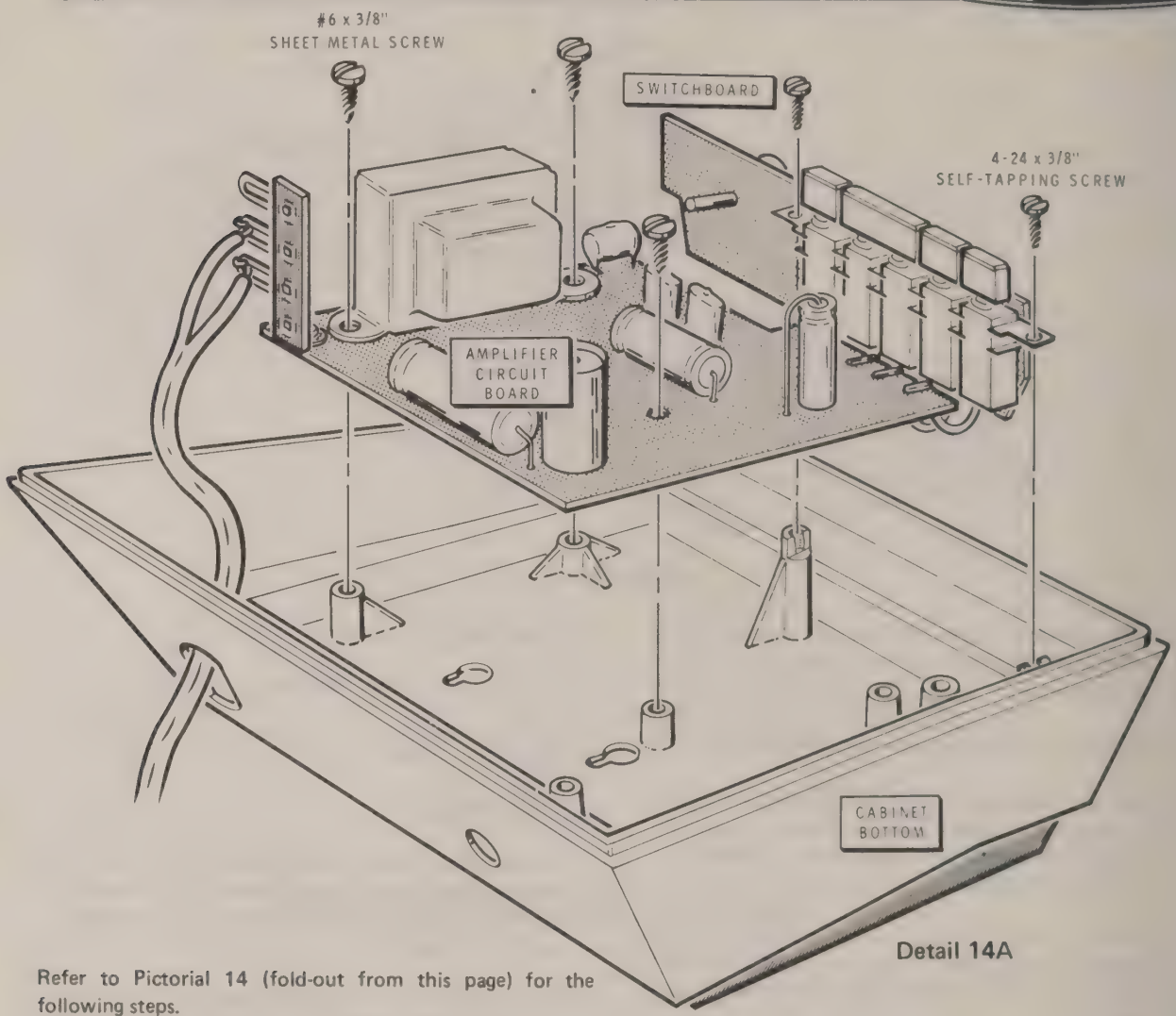
NOTE: In the following step be sure to wrap the line cord wire ends completely and tightly around the indicated solder lugs before you solder them.

( ) Connect one line cord wire to lug 3 (S-3) and the other line cord wire to lug 2 (S-3) of terminal strip D. Cut off any excess wire lengths. NOTE: If your kit is wired to operate on 240 Vac, the solder instructions are "lug 3 (S-2)" and "lug 2 (S-2)."



PICTORIAL 13





Detail 14A

Refer to Pictorial 14 (fold-out from this page) for the following steps.

( ) Pull the line cord back through the rear panel of the cabinet bottom and set the circuit board assembly into place as shown. Be sure the right end of the switchboard fits into the slot at the right front of the cabinet.

NOTE: In the following steps you will secure the switch assembly and the amplifier circuit board to plastic bosses in the master cabinet bottom. Do not overtighten these screws or you will strip the threading in the bosses.

( ) Secure the switch assembly to the front cabinet bosses with two 4-24 x 3/8" self-tapping screws as shown in Detail 14A.

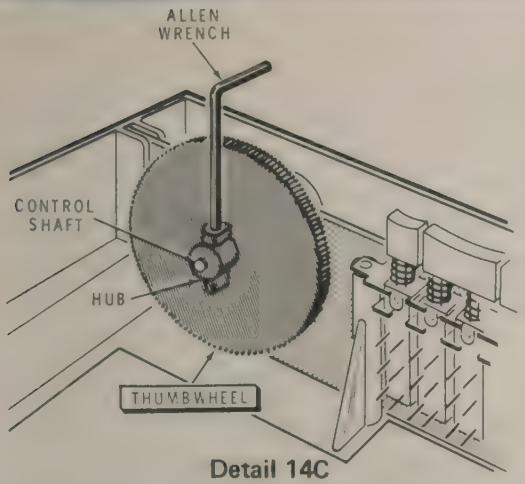
( ) Secure the amplifier circuit board to the bottom of the cabinet with three #6 x 3/8" sheet metal screws. Note that two of these screws hold the power transformer securely in place.

( ) Refer to Detail 14B and install the strain relief on the line cord at E as shown.

( ) Locate the flat thumbwheel, the small allen wrench, and the master cabinet top.

( ) Refer to Detail 14C and place the flat thumbwheel on the control shaft as shown. Be sure the protruding hub on the thumbwheel is toward the rear of the cabinet.

( ) Slide the thumbwheel forward on the control shaft until the end of the control shaft just appears at the rear of the thumbwheel hub. Tighten the thumbwheel onto the control shaft with the small allen wrench.



Detail 14C

( ) Temporarily tuck all of the wire ends down into the master cabinet. Fit the master cabinet top into place on the cabinet bottom; then check to see that the thumbwheel is centered in the "Volume" slot. If it is not, remove the cabinet top, loosen the allen screw, and move the thumbwheel forward or rearward until it is properly centered in the slot. Set the cabinet top aside.

( ) Locate the two 7" wires coming from the rear of the switch assembly in the master cabinet. Twist these two wires together as shown in Pictorial 14; then temporarily position them forward over the front of the cabinet.

( ) Locate the 5-screw terminal strip.

Refer to Pictorial 14 for the following steps.

NOTE: To properly identify the wires in the following steps, the switches will be numbered from bottom to top, 1 to 5, as viewed from the top as you face the left side of the cabinet.

( ) Locate the wire emerging from the slot between switches 4 and 5. Position terminal strip F as shown, and connect the free end of this wire to lug 4 of terminal strip F (S-1).

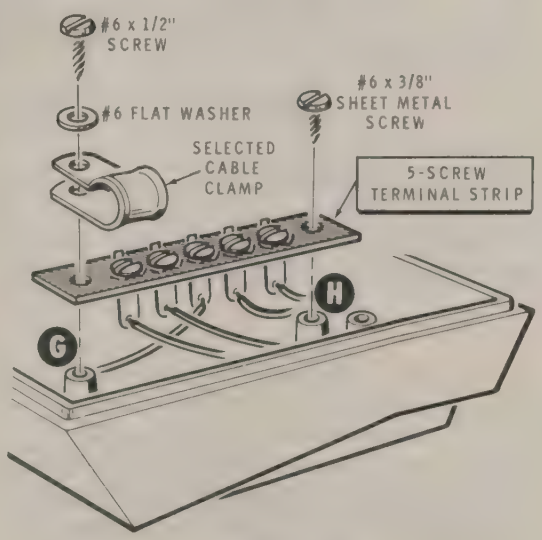
( ) Locate the short wire emerging from the slot between switches 3 and 4. Connect the free end of this wire to lug 5 of terminal strip F (S-1).

( ) Locate the bottom wire emerging from the slot between switches 1 and 2. Connect the free end of this wire to lug 2 of terminal strip F (S-1).

( ) Locate the top wire emerging from the slot between switches 1 and 2. Connect the free end of this wire to lug 1 of terminal strip F (S-1).

( ) Locate the wire coming from the hole marked "LUG 3" on the rear corner of the amplifier circuit board. Connect the free end of this wire to lug 3 of terminal strip F (S-1).

( ) Cut off any excess wire lengths on lugs 1 through 5 of terminal strip F.

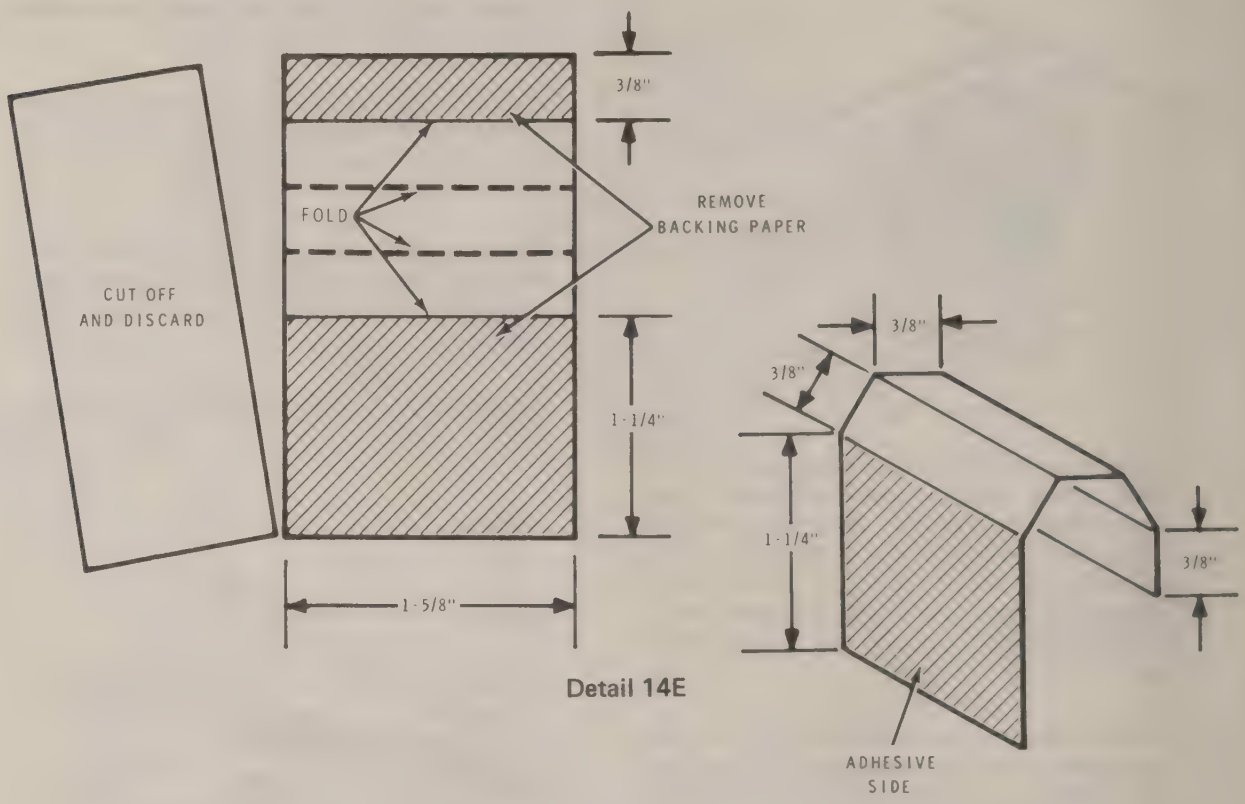


Detail 14D

( ) Refer to Detail 14D and install 5-screw terminal strip F on cabinet boss H with one #6 x 3/8" sheet metal screw.

NOTE: Two cable clamps have been provided with your kit. If you plan to install only one Remote station, use the smaller of the two clamps. Use the larger clamp if two Remote stations will be connected to the Master.

( ) Temporarily mount the selected cable clamp and the rear of terminal strip F to cabinet boss G with a #6 x 1/2" screw and a #6 flat washer.



Detail 14E

( ) Refer to Detail 14E and fold the paper insulator as shown. Be sure the waxed-paper side is on the outside as you fold the insulator. NOTE: The insulator will have four folds.

( ) Peel the waxed-paper backing from the insulator. Refer to Pictorial 14 and press the insulator into place over the top of terminal strip D. Press the adhesive backing firmly against the rear of the transformer and against the inside rear of the cabinet bottom.

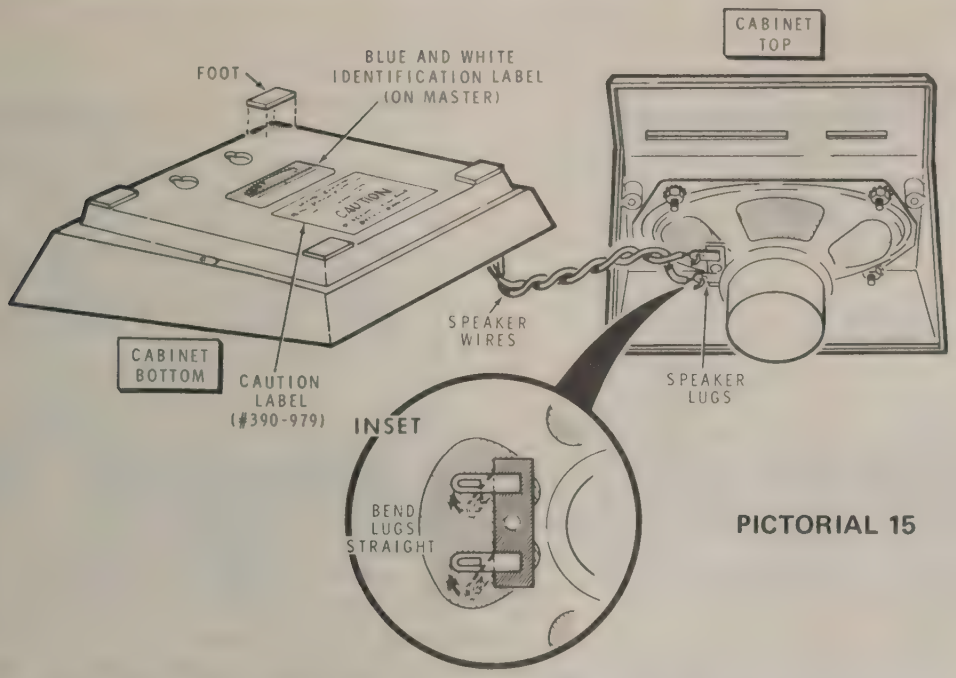
Set the master cabinet bottom assembly aside temporarily.

Refer to Pictorial 15 for the following steps.

NOTE: Before you connect the wires in the following steps, be sure to match the cabinet halves for the Remote unit, and the cabinet halves for the Master unit.

( ) If the lugs on your speakers are bent upward at an angle, carefully bend them down until they are straight as shown in the inset on Pictorial 15.

( ) Locate the two long wires in the remote cabinet bottom. Then twist these wires together.



PICTORIAL 15

( ) Position the remote cabinet top and bottom as shown in the Pictorial.

( ) Connect one of the two long wires to either lug of the speaker (S-1).

( ) Connect the other long wire to the remaining speaker lug (S-1).

Set the remote assembly aside temporarily.

( ) Position the master cabinet top and bottom as shown in the Pictorial.

( ) Locate the two long wires coming from the switchboard in the master cabinet bottom.

( ) Connect one of the long wires to either lug of the speaker (S-1).

( ) Connect the other long wire to the remaining speaker lug (S-1).

( ) Remove the backing from four rubber feet and press them into place on the four corners of either cabinet bottom as shown in the Pictorial.

( ) Remove the backing from the remaining four rubber feet and press them into place on the four corners of the other cabinet bottom.

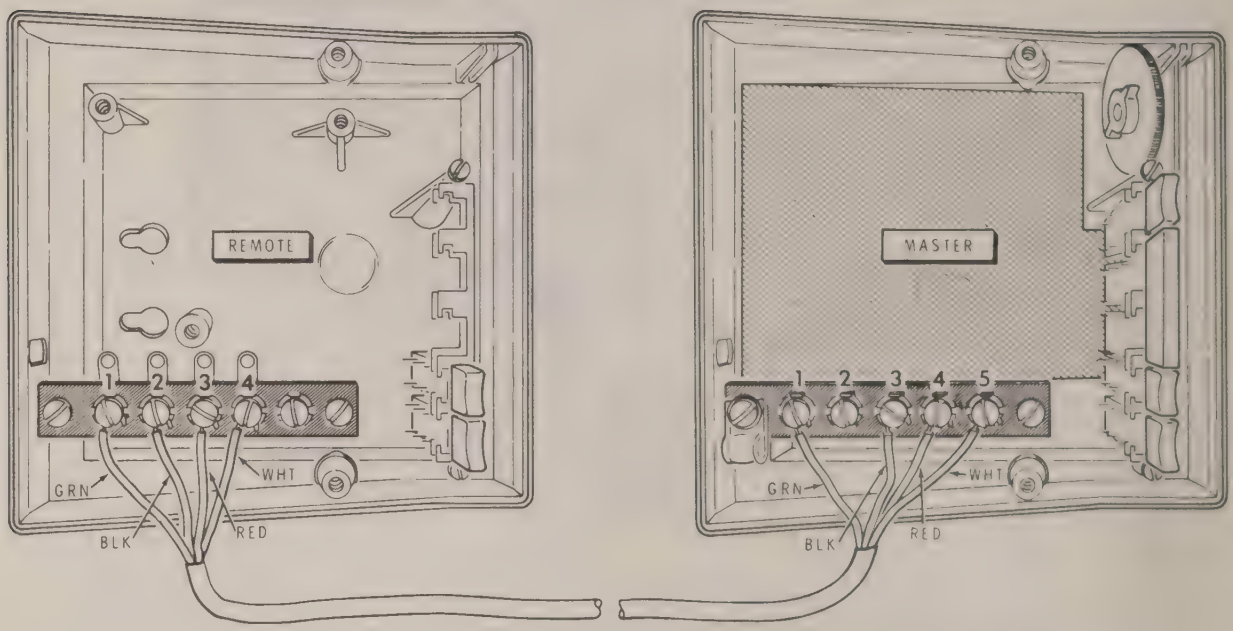
NOTE: The blue and white label which will be installed in the following step shows the Model number and the Production Series number of your kit. Refer to these numbers in any communications with the Heath Company about this kit.

( ) Carefully remove the paper backing from the blue and white label. Press the label into place on the underside of the master cabinet bottom as shown.

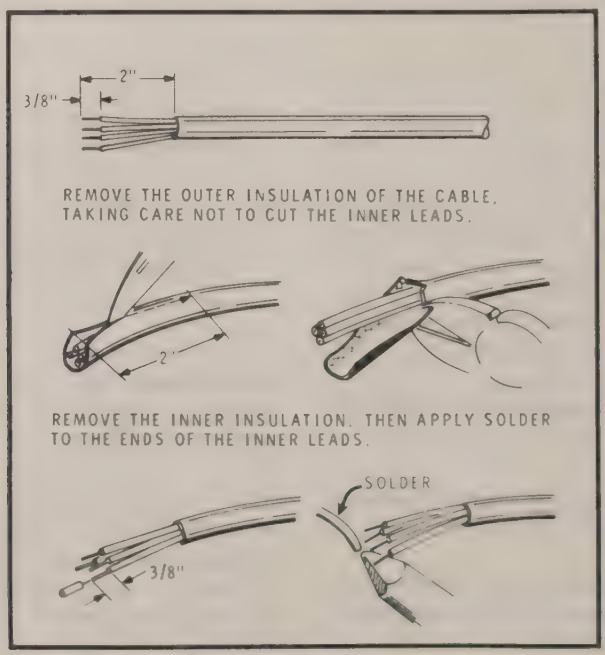
( ) Remove the paper backing from the caution label (#390-979). Press it into place on the master cabinet bottom as shown in Pictorial 15.

This completes the "Step-by-Step Assembly" of your Intercom System. Check to be sure all connections are soldered and that both units are correctly wired.

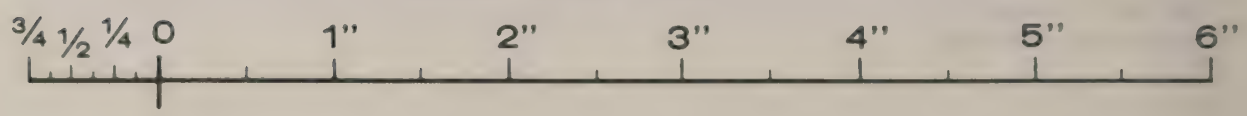
NOTE: If you have purchased an optional Model GD-120 Remote Intercom for a three-station system, complete the assembly instructions for that unit before you proceed with the "Initial Tests" on Page 29 of this Manual. Also note that you should disregard any reference in the Model GD-120 Manual to the Model GD-110 Master Intercom System. Installation instructions for the Model GD-120 Remote Intercom, when used with the GD-140 Master Station, are complete in this Manual.



PICTORIAL 16


2"
3/8"
REMOVE THE OUTER INSULATION OF THE CABLE, TAKING CARE NOT TO CUT THE INNER LEADS.
2"
REMOVE THE INNER INSULATION. THEN APPLY SOLDER TO THE ENDS OF THE INNER LEADS.
SOLDER
3/8"

Detail 16A



INITIAL TESTS

NOTE: Your installation needs may require the use of only one Remote Station. However, in order to completely check out the Master Intercom Station, you should check both switching circuits – those for Station #1 and Station #2. To do this, first complete the instructions under "Station #1," and then complete those listed under "Station #2."

WARNING: High voltage is present in the Master Intercom station. See the "Identification Photograph" on Page 51.

STATION #1

Refer to Pictorial 16 for the following steps.

NOTE: Do not cut any long lengths of cable you may have purchased. Prepare the ends of a long cable as instructed in the following steps, coil the unused portion to one side, and connect the ends of the cable as directed. Permanent installation will be done later.

( ) Prepare the ends of a length of cable as shown in Detail 16A.

( ) Refer to the Pictorial and connect the ends of the cable to the remote station and to the master intercom terminal strips as shown.

( ) Place the Remote station at least three feet from the Master station.

( ) Turn the VOLUME control on the Master all the way to the left; then turn it approximately 1/3 rotation to the right.

( ) Depress each of the buttons on both the Remote and the Master stations. If any button remains in the down position, push it once again to be sure it is up.

CAUTION: When you plug the line cord into the receptacle in the following step, if you hear a loud hum, unplug the line cord immediately and refer to the "In Case of Difficulty" section of this Manual.

( ) Plug the line cord into an ac outlet. You may hear a faint hum in the speakers.

( ) Press and hold the TALK button on the Remote station. Tap the cabinet top of the Remote station with a pencil; you should hear the tapping sound at the Master. NOTE: If you hear a loud squeal (feedback) at the Master, move the Remote unit a little further away from the Master and reduce the volume level at the Master by moving the control toward the left.

( ) Release the TALK button.

( ) Press the DICTATE button on the Remote. Again tap the remote cabinet top with a pencil. You should hear the tapping at the Master station.

( ) Release the DICTATE button by depressing it once again.

( ) Depress the STA 1 button on the Master.

( ) Depress and hold the TALK button on the Master; then tap the cabinet top with a pencil. The tapping should be heard in the remote speaker.

( ) Release the TALK button and depress the DICTATE button on the Master. Tap the cabinet top Once again you should hear the tapping in the remote speaker.

( ) Depress and release the DICTATE button on the Master.

( ) Disconnect the line cord.

STATION #2

Refer to Pictorial 17 for the following steps.

NOTE: It is necessary to check both Remote 1 and Remote 2 operations from the master station. Therefore, if you have only one Remote station, leave the wiring connected to that station and call it Remote station #2 in the following steps. If you have purchased a second Remote station, use the second Remote unit for the following steps.

( ) Connect one end of the cable to the Remote station #2 terminal strip as shown in the Pictorial.

( ) In the Master station, disconnect only the wire connected to screw terminal 1. Connect this wire to screw terminal 2. The other three wires should remain as shown in the Pictorial. Once again, do not make permanent connections during this testing phase.

( ) Place the Remote station at least three feet from the Master station.

( ) Turn the VOLUME control on the Master approximately 1/3 rotation toward the right.

( ) Make sure that all switch buttons on both the Remote and Master are in the up position.

( ) Plug the line cord into an outlet. You should hear a faint hum in the speakers.

( ) Press and hold the TALK button on the Remote station. Tap the cabinet top of the Remote station with a pencil; you should hear the tapping sound at the Master. NOTE: If you hear a loud squeal (feedback) at the Master, move the Remote unit a little further away from the Master and reduce the volume level at the Master by moving the control toward the left.

( ) Release the TALK button.

( ) Press the DICTATE button on the Remote. Again tap the remote cabinet top with a pencil. You should hear the tapping at the Master station.

( ) Release the DICTATE button by depressing it and releasing it once again.

( ) Depress the STA 2 button on the Master.

( ) Depress and hold the TALK button on the Master; then tap the cabinet top with a pencil. The tapping should be heard in the remote speaker.

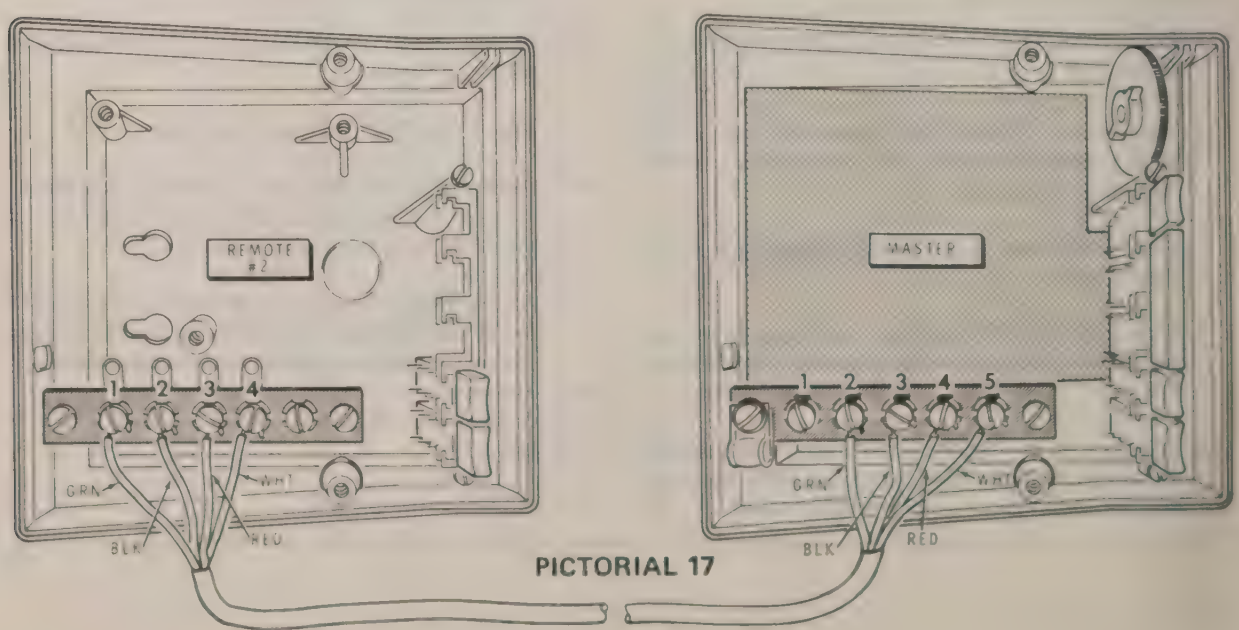
( ) Release the TALK button and depress the DICTATE switch on the Master. Tap the cabinet top. Once again you should hear the tapping in the remote speaker.

( ) Depress and release the DICTATE button on the Master.

( ) Disconnect the line cord.

( ) Disconnect the cable wires from the Remote and Master stations.

This completes the "Initial Tests" of your kit. Proceed to the "Installation" section of the Manual.



PICTORIAL 17

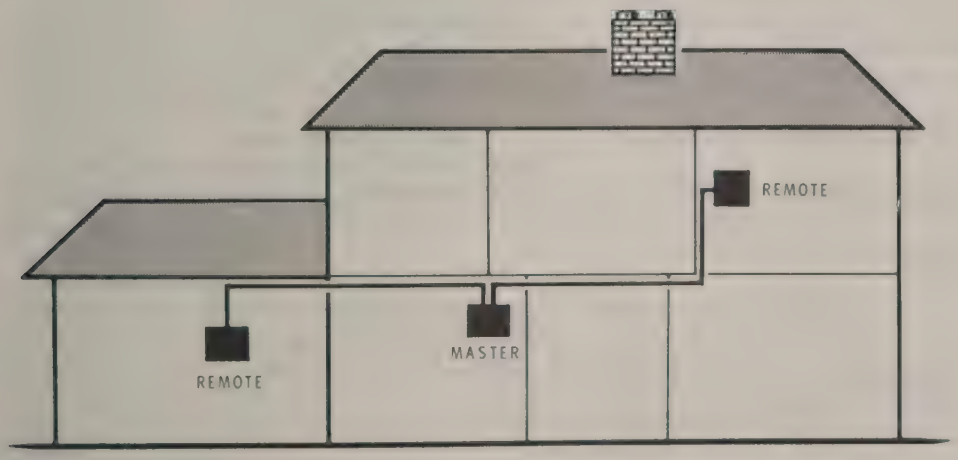
INSTALLATION

Refer to Pictorial 18.

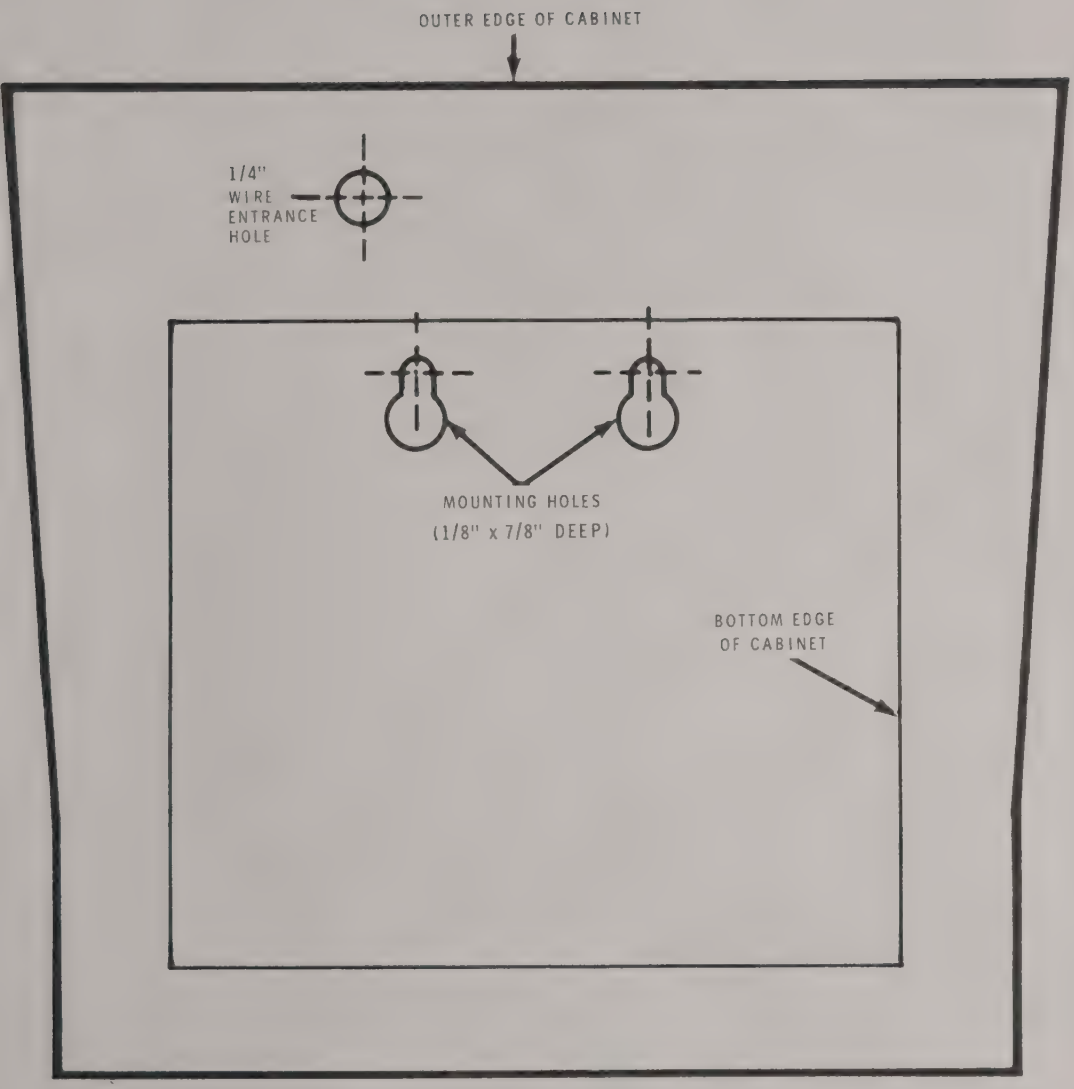
By this time you should have determined your cable requirements. To do this you should locate the positions in your home or office where each intercom unit will be placed. Then measure the distances between your master station and each remote unit. Be generous with your lengths; be sure to order an ample length of cable. Also, you may wish to change unit locations from time to time; extra cable lengths can be easily pushed back into the wall, or into overhead runs.

NOTE: In selecting a suitable location for your Master Station, be sure it is near an AC wall receptacle.

It is recommended that you use the 4-conductor Intercom Wire Pack, Model GDA-110-2, available from Heath Company.



PICTORIAL 18



WALL MOUNTING TEMPLATE
(FULL SIZE)

PICTORIAL 19

REMOTE STATIONS

If the unit is to be wall-mounted, perform the following steps. If it is to be used on a desk or shelf, disregard these steps and proceed to "Desk or Shelf Mounting" (below).

Wall-Mounting

( ) Choose a location for the unit where it is clear of door frames, window frames, or other objects. Then detach the wall-mounting template, Pictorial 19 (fold-out from this page), from the Manual and tape it to the wall location.

( ) Mark the holes for the cable and the two mounting screws using a pointed object such as a center punch or a nail.

( ) Drill a 1/4" diameter hole for the cable, and two 1/8" diameter x 7/8" deep holes for the mounting screws.

( ) Route the cable coming from the Master station through the 1/4" wall hole. Be sure to allow enough cable to extend from the wall to permit the screw installation in the following steps.

( ) Install two #6 x 1" screws into the 1/8" x 7/8" wall holes until the screw heads are 1/4" from the wall.

( ) Route the cable through hole C in the rear of the remote cabinet bottom.

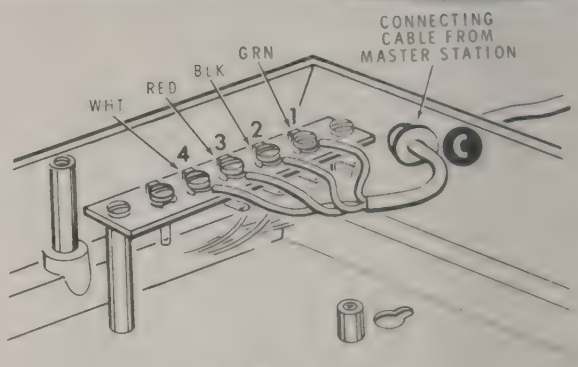
( ) Hang the cabinet bottom from the wall screws.

Proceed to "Remote Final Assembly."

Desk or Shelf Mounting

Refer to Pictorial 20 for the following steps.

( ) If the Remote Intercom is to be used on a desk or shelf, route the cable from the Master section through hole C and into the cabinet.



PICTORIAL 20

Remote Final Assembly

NOTE: The following instructions apply to both the wall-mounted units and to units used on a desk or shelf.

( ) Tie a knot in the cable inside the cabinet as shown.

( ) Form a small hook in the wire ends.

Connect the cable wires to the terminal strip screws as follows:

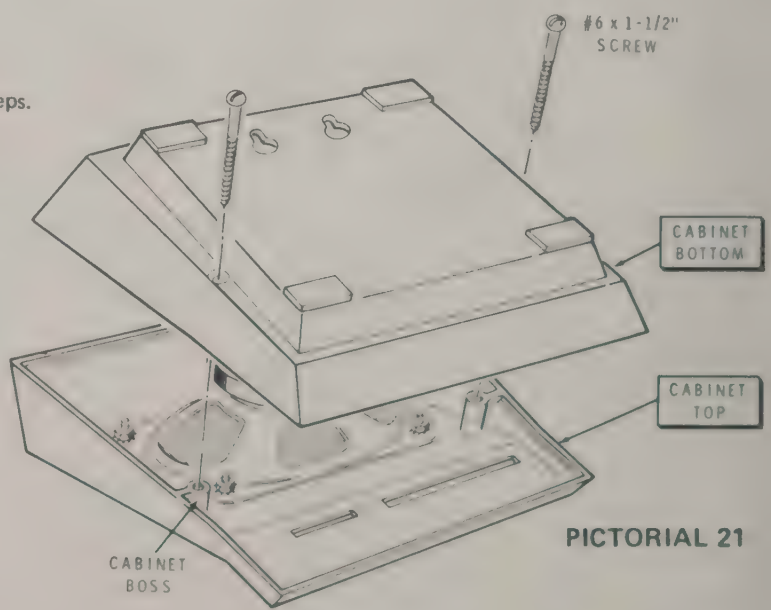
( ) Green wire to terminal 1.

( ) Black wire to terminal 2.

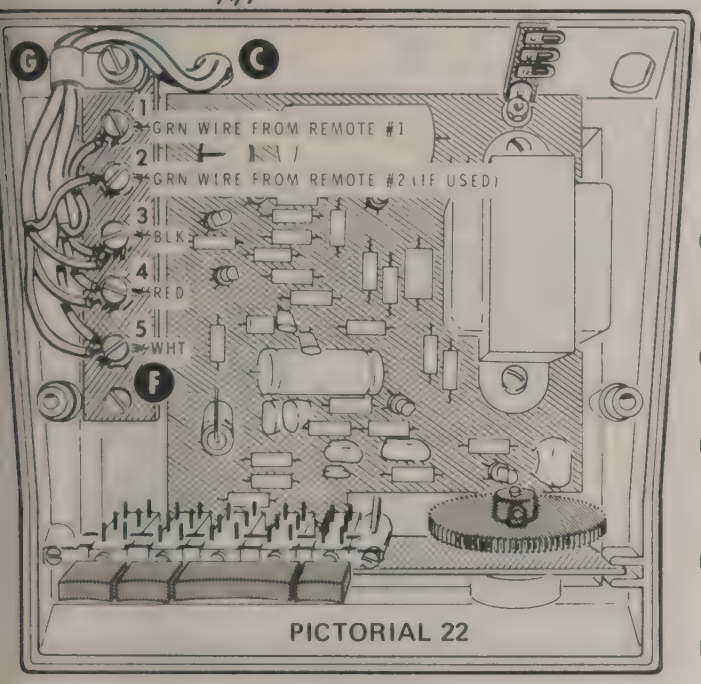
( ) Red wire to terminal 3.

( ) White wire to terminal 4.

Refer to Pictorial 21 for the following steps.



PICTORIAL 21



PICTORIAL 22

( ) Position the cabinet top and cabinet bottom together as shown so the two holes in the cabinet bottom match the bosses in the cabinet top. Fasten the top and bottom together with two #6 x 1-1/2" screws as shown. Be sure the speaker wires are inside the cabinet before you tighten the screws.

( ) If the unit is wall-mounted, push the cable back into its wall-hole; then hang the Remote Intercom station from its wall-mounting screws.

NOTE: If you have purchased a second Remote Intercom to be used with the Model GD-140 system, repeat all of the steps that apply to your own installation, beginning at "Remote Stations." Also note that, if you have purchased the optional Model GD-120 Remote Intercom, it is identical to the Remote station included in your Model GD-140 system.

MASTER STATION

NOTE: You must select a location for the Master station where an AC receptacle is within reach of the line cord.

If the unit is to be wall-mounted, do the following steps. If it is to be used on a desk or shelf, disregard these steps and proceed to "Desk or Shelf Mounting."

Wall-Mounting

( ) Choose a location for the unit where it is clear of door frames, window frames, or other objects. Then detach the wall-mounting template, Pictorial 19 (fold-out from Page 32), from the Manual and tape it to the wall location. NOTE: This is the same template used to wall-mount the Remote units.

( ) Mark the holes for the intercom cable and the two mounting screws. Use a pointed object such as a center punch or a nail.

( ) Drill a 1/4" diameter hole for the cable, and two 1/8" diameter x 7/8" deep holes for the mounting screws.

( ) Route the cable from the Remote station (two cables if you have two Remotes) from the inside of the wall through the 1/4" hole.

( ) Install two #6 x 1" screws into the 1/8" x 7/8" wall holes until the screw heads are 1/4" from the wall.

Refer to Pictorial 22 for the following steps.

( ) Route the cable end(s) from the Remote unit(s) through hole C in the Master cabinet bottom.

( ) Hang the cabinet bottom from the wall screws.

Proceed to "Master Final Assembly."

Desk or Shelf Mounting

( ) If the Master Intercom is to be used on a desk or shelf, route the cable(s) from the Remote station(s) through hole C and into the cabinet.

Master Final Assembly

NOTE: If you have one Remote, use the small cable clamp for the following steps. If you have two Remotes, use the large cable clamp.

( ) Form a small hook on each of the intercom cable wire ends.

( ) Refer to the Pictorial and connect the green wire from Remote Intercom #1 to screw-terminal 1 of terminal strip F as shown.

( ) If you have a second Remote Intercom, connect the green wire from Remote Intercom #2 to screw-terminal 2 of terminal strip F. NOTE: If you do not have two Remote stations, terminal 2 is not used.

( ) Connect the black wire or wires to screw-terminal 3 of terminal strip F.

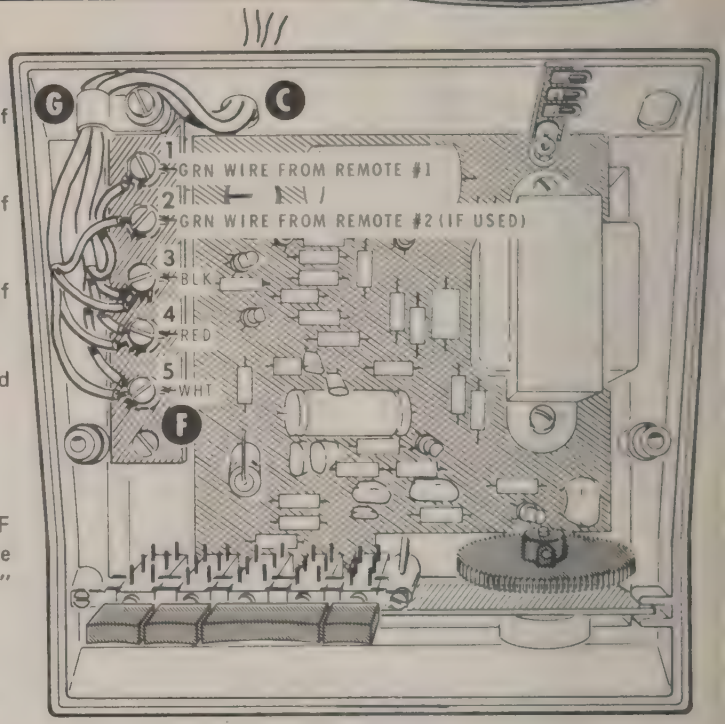
( ) Connect the red wire or wires to screw-terminal 4 of terminal strip F.

( ) Connect the white wire or wires to screw-terminal 5 of terminal strip F.

( ) Remove the #6 x 1/2" screw, the #6 flat washer, and the cable clamp from the rear of terminal strip F.

( ) Place the cable clamp around the cables as shown.

( ) Route the cable(s) around the end of terminal strip F as shown in the Pictorial. Then secure the clamp to the terminal strip and cabinet at G with the #6 x 1/2" screw and #6 flat washer previously removed.



PICTORIAL 22
(Repeat)

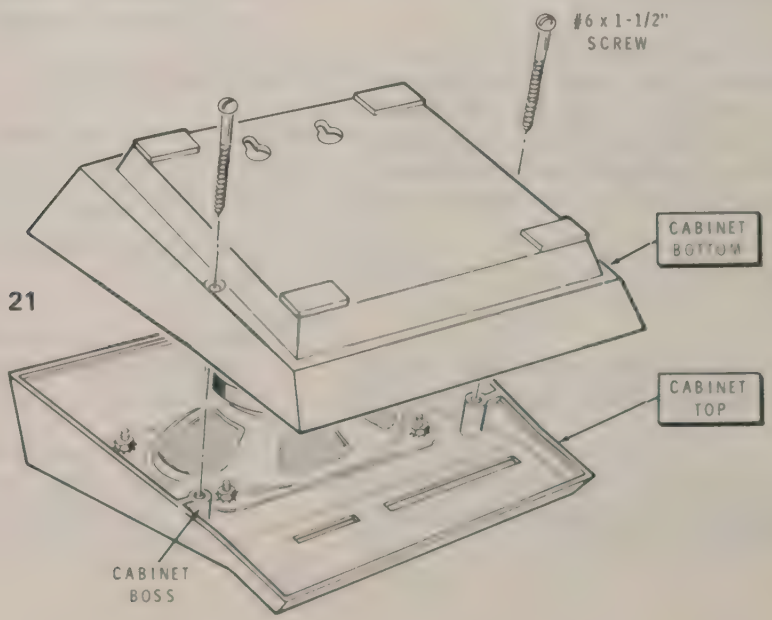
Refer to Pictorial 21 (repeat) for the following step.

( ) Position the cabinet top and cabinet bottom together as shown so the holes in the cabinet bottom match the bosses in the cabinet top. Fasten the top and bottom together with two #6 x 1-1/2" screws as shown. Be sure the speaker wires are inside the cabinet before you tighten the screws.

( ) If the Master station is to be wall-mounted, push the cable(s) back into the wall-hole, then hang the Master unit on its wall-mounting screws.

( ) Plug the Master Intercom line cord into an ac receptacle.

This completes the assembly of your Intercom Master System.



PICTORIAL 21
(Repeat)

OPERATION

Refer to Figure 1 for a description of the control and button functions of the Master Intercom unit.

Your Two-Station Intercom may be left plugged in, and therefore turned on, at all times since it uses only about as much power as an electric clock. Leave the TALK and DICTATE buttons up at all times when you are not otherwise using the Intercom.

When you talk to the Remote station, speak in your normal voice and remain at least two feet away from the Intercom so your voice does not overdrive the speaker-microphone and cause distortion. Adjust the VOLUME control to the desired level at the Remote and Master stations.

To talk to the Remote station, press the desired button for that station, either STA 1 or STA 2, or both stations at once if desired. Depress the TALK button and talk in a conversational tone. To listen to the Remote station, you must lift your finger from the TALK button until you wish to speak once again. For prolonged, one-way talking, depress the DICTATE button. To permit the Remote station to talk, you must once again depress the DICTATE button and release it to the up position. The purpose of the DICTATE button is to allow "hands-off" operation.

Refer to Figure 2 for a description of the switch functions of the Remote Intercom unit.

Your Remote Intercom is always on when the Master is on, since the power for the Remote comes from the Master through the four-wire cable. The Remote Intercoms are "private" stations. This means that no one can monitor the Remote unit unless the Remote TALK or DICTATE buttons are in the down position. At no time can one Remote station converse with the other Remote station.

To call the Master station, depress the TALK button and speak in a conversational tone from a distance of about two feet. If you are closer to the station you may overdrive the system and cause distortion at the Master station. To listen for a reply, release the TALK button until you once again wish to talk to the Master station.

If you desire a one-way, hands-off communication with the party at the Master station, depress the DICTATE button until you have finished speaking. Then, to hear a reply, you must depress and release the DICTATE button to the up position. The buttons should be kept in the up position except when you are talking, in order to listen for calls from the Master.

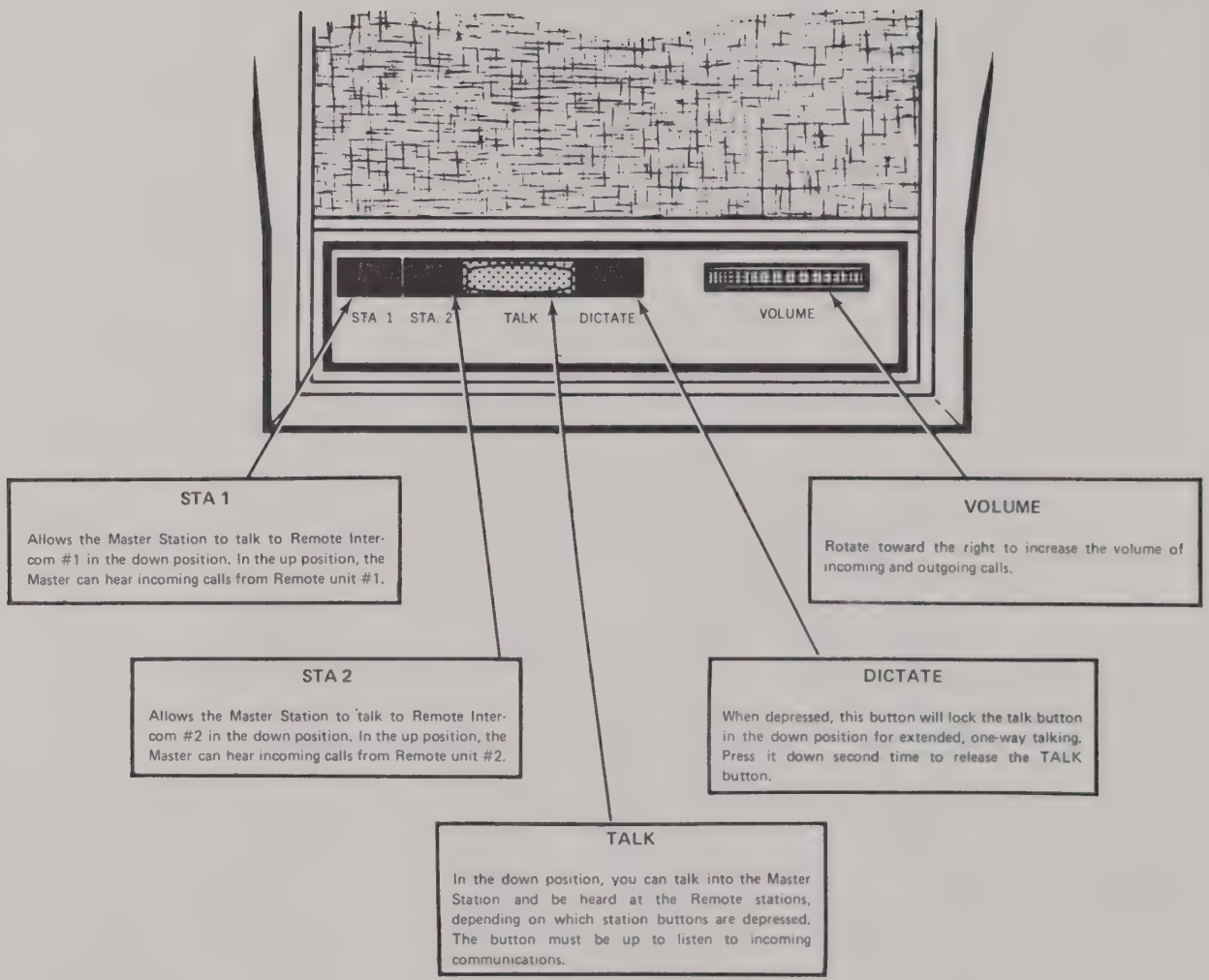
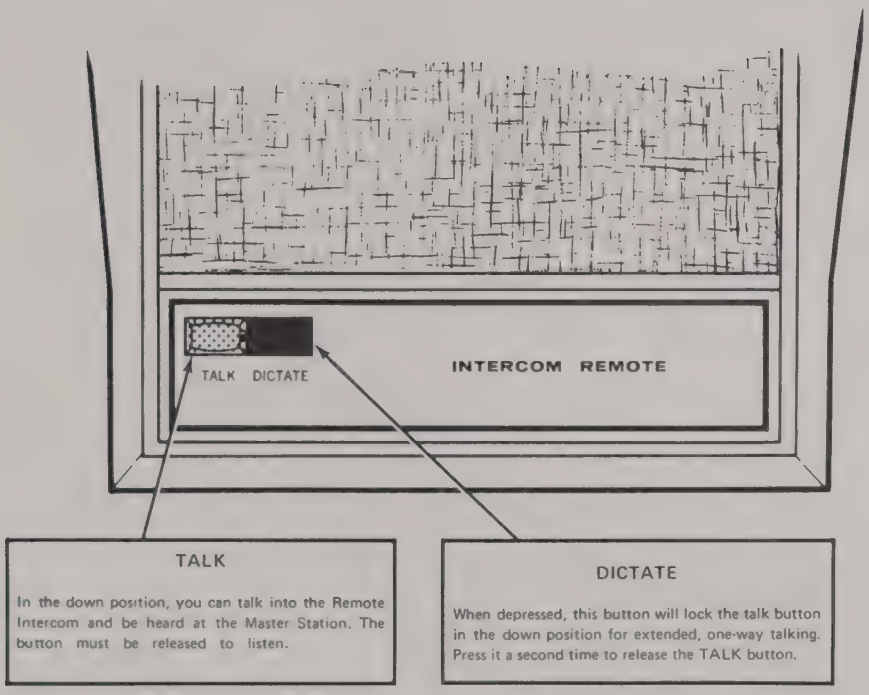

STA 1
STA. 2
TALK
DICTATE
VOLUME
STA 1
Allows the Master Station to talk to Remote Intercom #1 in the down position. In the up position, the Master can hear incoming calls from Remote unit #1.
VOLUME
Rotate toward the right to increase the volume of incoming and outgoing calls.
STA 2
Allows the Master Station to talk to Remote Intercom #2 in the down position. In the up position, the Master can hear incoming calls from Remote unit #2.
DICTATE
When depressed, this button will lock the talk button in the down position for extended, one-way talking. Press it down second time to release the TALK button.
TALK
In the down position, you can talk into the Master Station and be heard at the Remote stations, depending on which station buttons are depressed. The button must be up to listen to incoming communications.

FIGURE 1



TALK

In the down position, you can talk into the Remote Intercom and be heard at the Master Station. The button must be released to listen.

DICTATE

When depressed, this button will lock the talk button in the down position for extended, one-way talking. Press it a second time to release the TALK button.

FIGURE 2

IN CASE OF DIFFICULTY

This section of the Manual is divided into two parts: "General Troubleshooting Information" and "Troubleshooting Chart." The "General Troubleshooting Information" lists checks of a general nature that you can make to locate a difficulty. It also gives some "Precautions for Bench Testing." The "Troubleshooting Chart" lists some specific difficulties that could occur, tells you what could cause these difficulties, and describes checks you can make to remedy the problem or be sure which part is faulty.

GENERAL TROUBLESHOOTING INFORMATION

Paragraphs 1 through 5, which follow, describe the types of difficulties which may occur following assembly of the kit. These difficulties are usually caused by assembly errors or faulty soldering.

NOTE: In an extreme case where you are unable to resolve a difficulty, refer to the "Customer Service" information inside the rear cover of the Manual. Your Warranty is located inside the front cover.

Visual Tests

1. Recheck the wiring. It is frequently helpful to have a friend check your work. Someone who is not familiar with the unit may notice something consistently overlooked by the builder.

2. About 90% of the kits that are returned for repair do not function properly due to poor connections and soldering. Therefore, many troubles can be eliminated by reheating all connections to make sure they are soldered as described in the "Soldering" section of the "Kit Builders Guide."

3. Check the values of the parts. Be sure that the proper parts have been installed into each circuit, as shown in the pictorial diagrams and as called out in the assembly instructions.

4. Check for bits of solder, wire ends, or solder bridges between adjacent circuit board foils.

5. Check to be sure the wires are routed as shown in the Pictorials in the "Step-by-Step Assembly" section of the Manual.

6. If, after careful checks, the trouble is still not located and a voltmeter is available, check the voltages in the circuit of your Intercom against those shown on the Voltage Chart on Page 49 and the Schematic (fold-out from Page 51). NOTE: All voltage readings were taken with a high impedance voltmeter. Some voltages may vary as much as ±20%.

7. A review of the "Circuit Description" and study of the Schematic may also help you locate a difficulty. Refer to the "X-Ray Views" of the circuit board on Pages 47 and 48 to help locate parts.

Precautions for Bench Testing

1. Be cautious when testing transistor circuits. Although transistors have almost unlimited life when used properly, they are vulnerable to damage from excessive voltage or current. A transistor cannot be operated under shorted, zero-bias, excessive-voltage, or high-current conditions without materially damaging it. Any one of these conditions can completely destroy a transistor instantly.

2. Be sure you do not short any terminals to ground when making voltage measurements. If the probe should slip, for example, and short out a bias or voltage supply point, it is almost certain to cause damage to one or more transistors or diodes.

3. Do not remove transistors while the Intercom is plugged in; this could damage the Intercom.

4. Do not remove the circuit boards while the Intercom is plugged in.

WARNING: The full ac line voltage is present in the power supply wiring of the Intercom. Be careful to avoid an electrical shock while working on the Intercom.

TROUBLESHOOTING CHART

This chart lists a number of difficulties that could keep your Intercom from operating properly. Possible causes are listed for each difficulty, as well as checks to help you determine if a faulty component is causing the difficulty.

DIFFICULTY	POSSIBLE CAUSE AND POSSIBLE FAULTY COMPONENTS	CHECK
System inoperative.	Incorrect ac wiring.	Check transformer leads and line cord connections.
	Diodes D1 and D2.	Make sure diodes are correctly installed.
	Transistors Q1 through Q6.	Check for proper transistor installation, soldering, and voltages on transistor leads.
	Speaker.	Check for unsoldered leads or torn cone. Check continuity with ohmmeter.
	Edge-mount connectors.	Check connectors between switchboard and amplifier board; be sure there are no solder bridges between connectors or mounting foils, be sure solder connections are secure.
	Solder bridges on circuit boards.	Check all foils carefully; remove solder bridges if found.
Weak or distorted sound.	Transistors Q1 through Q6.	Check for incorrect installation or faulty components.
	Resistors.	Check to be sure all resistors are proper value and in correct locations.

DIFFICULTY	POSSIBLE CAUSE AND POSSIBLE FAULTY COMPONENTS	CHECK
	Capacitor C1.	Check for short.
	Speaker.	Check for defect.
	Solder-bridges between circuit board foils.	Check for bridges and clear if found.
Low volume, voltage normal at R23-R24 junction.	Open capacitors.	Check C4, C5, C7, C8, C10, C11, and C13.
Distorted sound.		
A. Voltage normal at R23-R24 junction.	Capacitor C10.	Check C10 for short.
B. Voltage high at R23-R24 junction.	Capacitor C11.	Check C11 for short.
C. Voltage low at R23-R24 junction.	Capacitor C9.	Check C9 for short.
D. Voltage at R23-R24 junction changes when TALK switch is pressed.	Capacitor C13.	Check C13 for short.
System noisy as Volume control is turned.	Control R12.	Check control R12. May be intermittent.
A. DC voltage variation at R23-R24 junction.	Capacitor C8.	Check C8 for short.
B. Q2 collector, DC voltage variation.	Capacitor C7.	Check C7 for short.
High hum, regardless of Volume setting.		
A. Voltage normal at R23-R24 junction.	Capacitor C6 or C14.	Check C6 or C14 for open.

DIFFICULTY	POSSIBLE CAUSE AND POSSIBLE FAULTY COMPONENTS	CHECK
B. Voltage high at R23-R24 junction.	Transistor Q6.	Check Q6 for short.
C. Voltage low at R23-R24 junction.	Transistor Q5.	Check Q5 for short.
Abnormal sounds in speaker.		
A. Volume control turned up high.	Capacitor C1.	Check C1 for open.
	Capacitors C2 or C3.	Check C2 or C3 for open or short.
B. Heard at normal Volume control setting.	Transistors Q1 or Q2; Incorrect voltages on transistor leads.	Check Q1 or Q2 for short.
	DC voltage on either lead of Capacitor C1.	Check capacitors C4 or C5 for shorts.
System operates after assembly and initial test, but is inoperative or hums after installation.	System interwiring.	Check for defective wiring between stations. Check terminal strip hookups.
	External ac device.	Reverse line cord plug in receptacle.
One-way conversation only.	Open circuit ground connection.	Check for open LUG 3 wire from amplifier circuit board to terminal strip. Check switchboard wiring. Check for open ground foil on either circuit board. Check interconnecting cable. May be improperly connected at either end.

SPECIFICATIONS

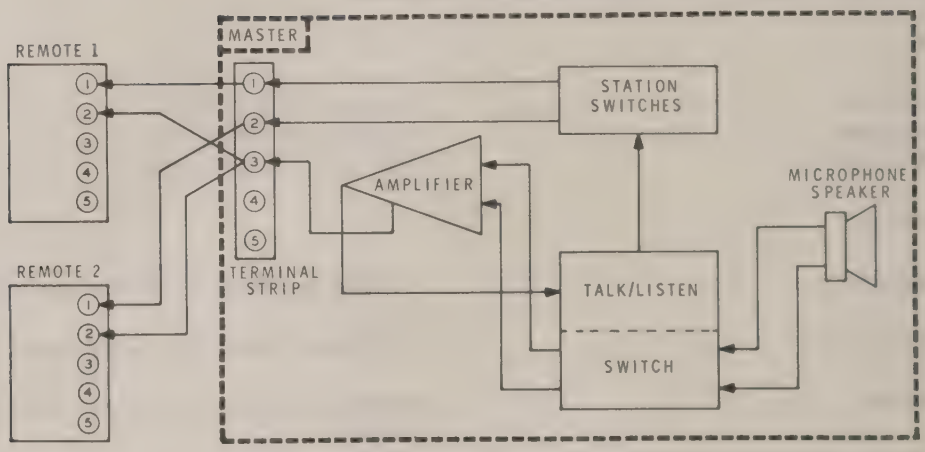
Power Output	
With 45 Ω Load	0.8 watt at 2-3% THD* typical.
With 45 Ω Load	1 watt at 10% THD typical.
With 22.5 Ω Load	0.9 watt at 10% THD typical.
Power Requirements	
0.7 Watt Output	120/240 Vac, 50-60 Hz, 3.5 watts maximum.
Standby (no signal)	120/240 Vac, 50-60 Hz, 0.8 watts typical.
System Connections	Designed for use with Heathkit Model GD-120 Remote Intercom.
Operational Functions	Selective or combined call to remotes: Dictate switch button, Volume control, private operation.
Amplifier Circuit	Differential input, Class AB output.
Cabinet Size	
Master or Remote (overall)	6" wide, 5-3/4" deep, 3-3/4" high.
Net Weight	2 lbs. 14 oz.

*Total Harmonic Distortion

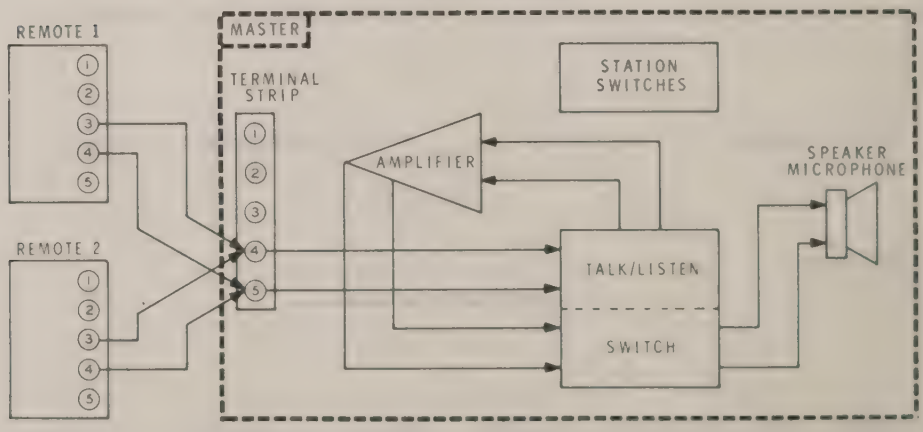
The Heath Company reserves the right to discontinue products and to change specifications at any time without incurring any obligation to incorporate new features in products previously sold.

BLOCK DIAGRAM

MASTER TALKS



MASTER LISTENS



CIRCUIT DESCRIPTION

NOTE: As you read this "Circuit Description," refer to the designated Block Diagrams (on Page 44) and to the Schematic Diagrams (fold-out from Page 51).

INTERCOM SYSTEM SIGNAL FLOW

Signal from the Master

Refer to the "Master Talks Block Diagram." The input signal, usually a persons voice, originates in the Master station at the microphone-speaker which is used as a microphone in this mode of operation. From the speaker, the signal goes to the differential amplifier through Talk switch pins 12-11 and 9-8.

From the amplifier, the signal is coupled through Talk switch at pins 2-3 and then to station 1 switch (for example) pins 2 and 3, and then to lug 1 on the master terminal strip. The signal is then routed from lug 1 of the terminal strip to Remote Intercom #1. The Remote Intercom microphone-speaker, being used as a loudspeaker, is connected to Talk switch pins 2 and 5. Incoming calls are routed through Talk switch pins 1 and 4 to pins 2 and 5 and the audible signal is heard.

Signal from the Remote

Refer to the "Master Listens Block Diagram." As the Talk button on the Remote station is depressed, the audible signal is routed from the microphone-speaker, used as a microphone, through Talk switch pins 2-3 and 5-6 to terminal strip lugs 3 and 4. The signal travels through the cable and is routed through lugs 4 and 5 of the Master terminal strip to the Master Talk switch (in its up position). The signal goes through Talk switch pins 10 and 7 to pins 11 and 8. From pins 11 and 8, the signal is routed into the amplifier circuit, and after it is amplified, is coupled through Talk switch pins 2 and 1 of the speaker. The other lead of the speaker is grounded through Talk switch pins 5 and 4 to complete the circuit.

AMPLIFIER CIRCUIT

Refer to the "Master Listens Block Diagram" and to the Amplifier Schematic Diagram (fold-out from Page 51) as you read the following information.

Input signals to the amplifier are coupled to a differential amplifier stage consisting of transistors Q1 and Q2 through an R-C (resistor-capacitor) network. This R-C network, made up of resistors R1, R2, R3, and R4, and capacitors C1, C2, and C3, filters out high frequencies that may be picked up in long intercom cables. Transistors Q1 and Q2 amplify the incoming signal and, through common-mode rejection, remove most interference. Resistors R5 through R11 set the proper bias voltages and currents for the differential amplifier.

The signal is coupled from the collector of transistor Q2 through capacitor C7 to the ungrounded end (terminal 1) of the Volume control on the switchboard. A portion of the signal is routed from terminal 2 of the Volume control back to the amplifier circuit where it is coupled through capacitor C8 and resistor R14 to the base of transistor Q3. Capacitors C9 and C10 pass to ground any undesirable frequencies that may remain.

The amplified signal from the collector of transistor Q3 is direct coupled to the base of transistor Q4 where it is further amplified. The signal then goes to transistors Q5 and Q6. Resistor R19 determines the class AB operating point of the output transistors, and minimizes crossover distortion.

Transistors Q5 and Q6 operate as a push-pull output stage. The output signal from these transistors goes through capacitor C13 and out of the amplifier to pin 2 of the Talk switch.

POWER SUPPLY

AC power from the line cord is connected to the primary windings of power transformer T1. 120-volt operation is obtained by wiring the transfomer primary in parallel. In this case, the black-red and the black-yellow transformer leads are connected to one side of the ac line. The black-yellow and the black leads are connected to the other side of the ac line.

240-volt operation is obtained by wiring the primary leads of transformer T1 in series. The black-red lead is connected to one side of the ac line, the black lead is connected to the other side of the ac line, and the black-green and black-yellow leads are connected together.

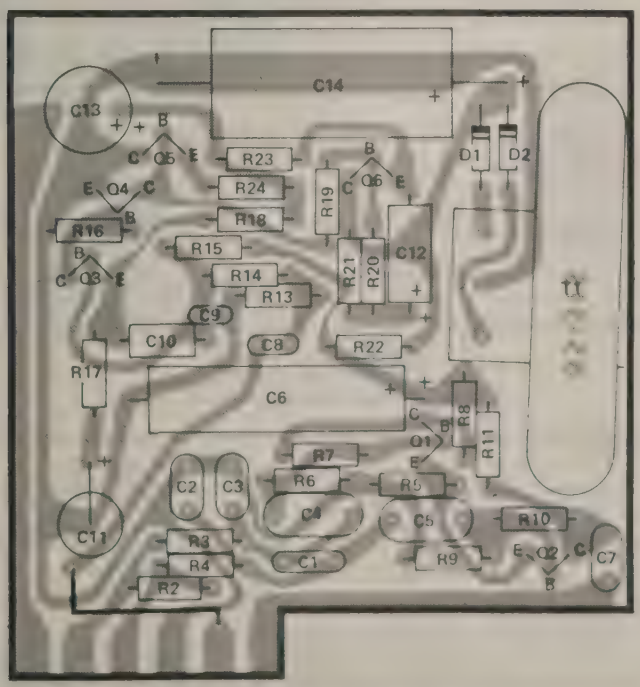
The secondary winding of the power transformer is connected to a full-wave rectifier circuit that includes diodes D1 and D2. The dc output from the rectifiers is filtered by filter capacitor C14.

CIRCUIT BOARD X-RAY VIEWS

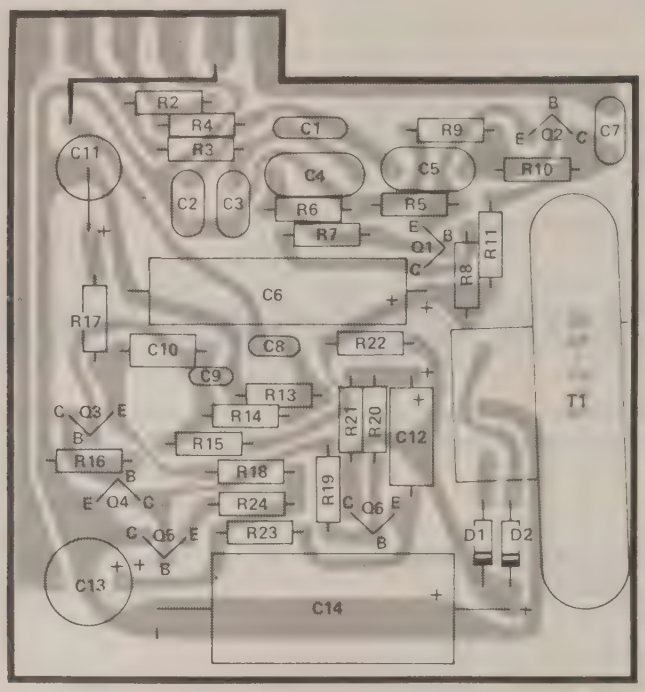
NOTE: To determine the value (68 kΩ, .22 μF, etc.) of one of these parts, proceed in either of the following ways.

1. Refer to the place where the part is installed in the "Step-by-Step" instructions.

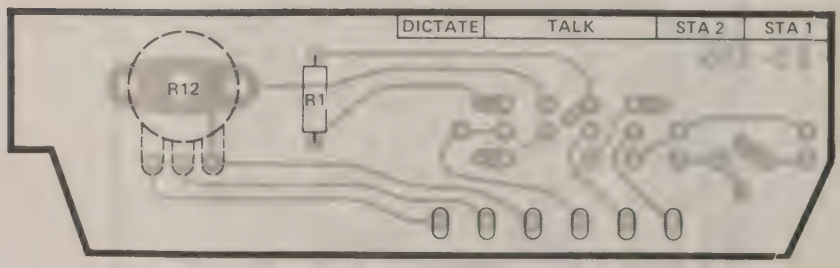
2. Note the identification number of the part (R-number, C-number, etc.). Then locate the same identification number next to the part on the "Schematic Diagram." The value, or description, of the part should be near this number. For diodes and transistors, refer to the "Transistor-Diode Chart" on Page 49.



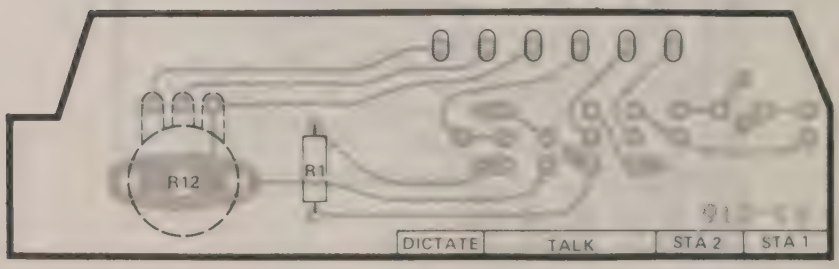
AMPLIFIER CIRCUIT BOARD
(Viewed From Component Side)



AMPLIFIER CIRCUIT BOARD
(Viewed From Foil Side)

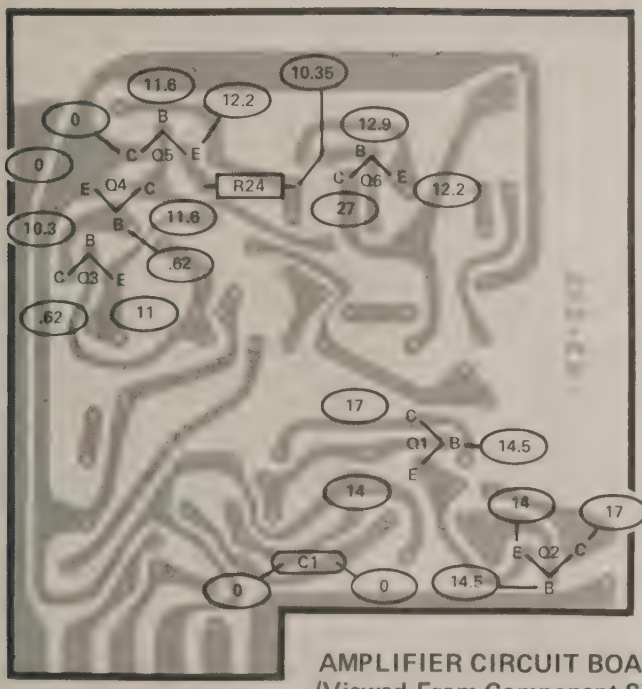


SWITCH BOARD
(Viewed From Component Side)



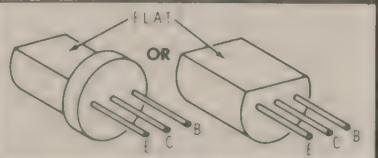
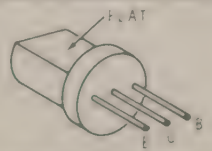
SWITCH BOARD
(Viewed From Foil Side)

VOLTAGE CHART

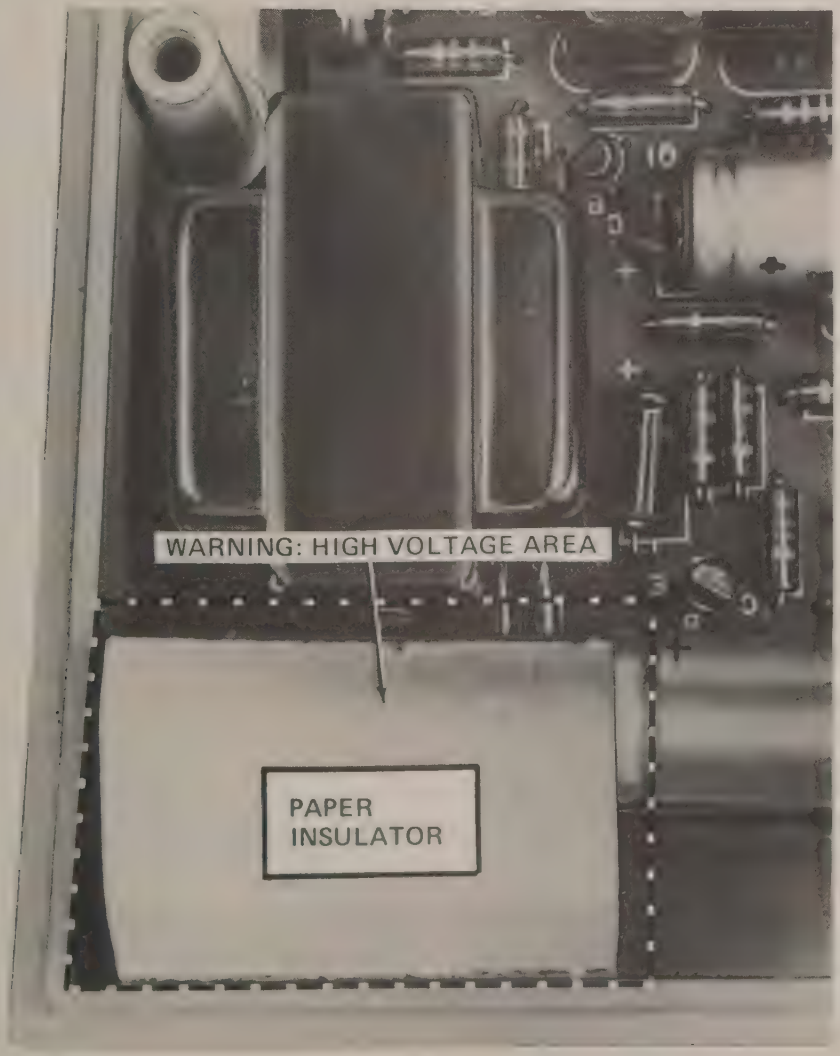


AMPLIFIER CIRCUIT BOARD
(Viewed From Component Side)

TRANSISTOR-DIODE CHART

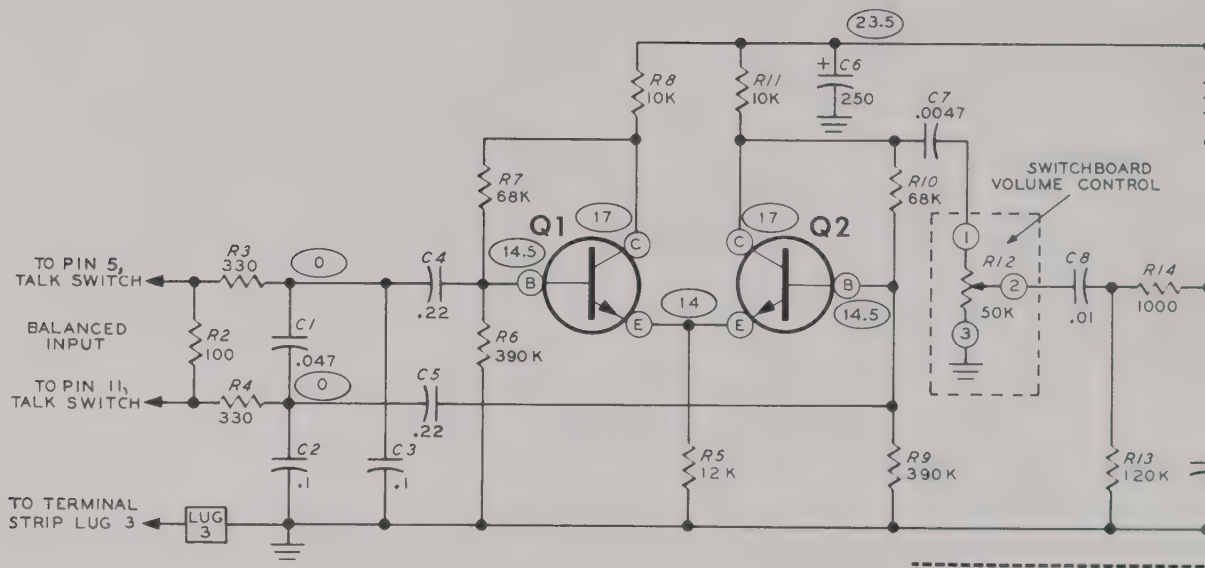
COMPONENT	HEATH PART NUMBER	CASE DIAGRAM
Q1, Q2	417-91	
Q3, Q5	417-201	
Q4	417-118	
Q6	417-94	
D1, D2	57-65	

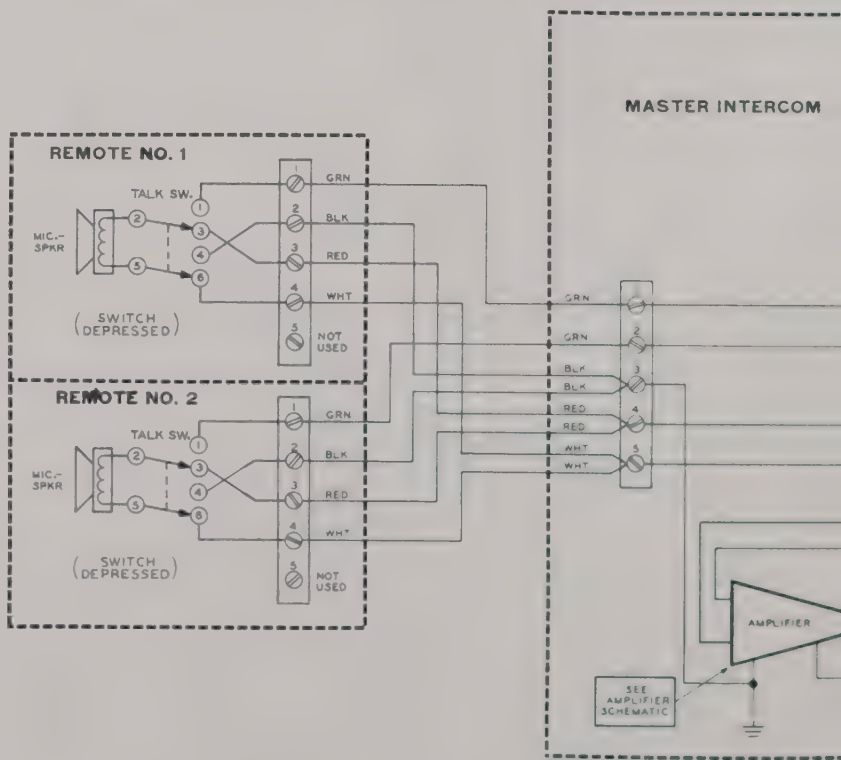
IDENTIFICATION PHOTOGRAPH



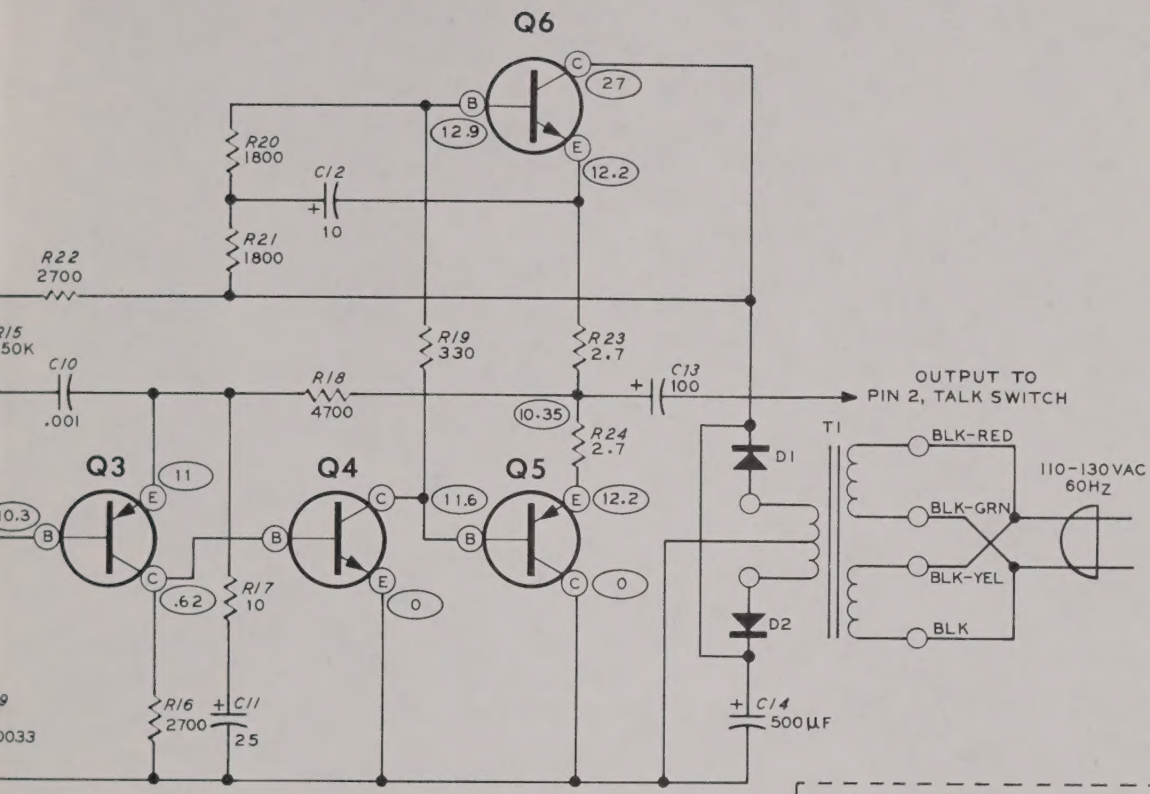
SCHEMATIC OF THE HEATHKIT® TWO-STATION INTERCOM MODEL GD-140

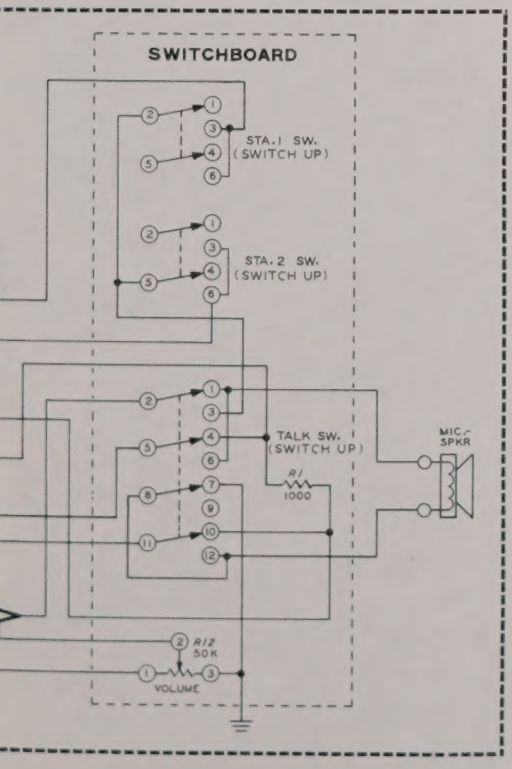
AMPLIFIER CIRCUIT

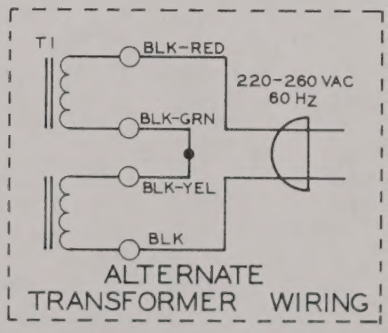




INTERCOM WIRE CIRCUIT







NOTES:

1. ALL RESISTORS ARE 1/2 WATT. RESISTOR VALUES ARE IN Ω (K=1000).
2. ALL CAPACITORS ARE IN µF.
3. ⬭ THIS SYMBOL INDICATES A POSITIVE (+) DC VOLTAGE, MEASURED FROM THE POINT INDICATED TO CIRCUIT BOARD GROUND (WIRE MARKED "LUG 3" ON THE AMPLIFIER CIRCUIT BOARD). THE VOLTAGES WERE MEASURED WITH A HIGH IMPEDANCE INPUT VOLTMETER, 120 VAC LINE VOLTAGE, AND WITH NO INPUT SIGNAL.
4. ⏚ THIS SYMBOL INDICATES COMMON GROUND.
5. ALL CONNECTIONS EXCEPT COMMON GROUND, "LUG 3", ON THE AMPLIFIER CIRCUIT BOARD ARE THROUGH EDGE CONNECTIONS.
6. □ THIS SYMBOL INDICATES A CIRCUIT BOARD WIRE CONNECTION.

CUSTOMER SERVICE

REPLACEMENT PARTS

Please provide complete information when you request replacements from either the factory or Heath Electronic Centers. Be certain to include the **HEATH** part number exactly as it appears in the parts list.

ORDERING FROM THE FACTORY

Print all of the information requested on the parts order form furnished with this product and mail it to Heath. For telephone orders (parts only) dial 616 982-3571. If you are unable to locate an order form, write us a letter or card including:

- Heath part number.
- Model number.
- Date of purchase.
- Location purchased or invoice number.
- Nature of the defect.
- Your payment or authorization for COD shipment of parts not covered by warranty.

Mail letters to: Heath Company
Benton Harbor
MI 49022
Attn: Parts Replacement

Retain original parts until you receive replacements. Parts that should be returned to the factory will be listed on your packing slip.

OBTAINING REPLACEMENTS FROM HEATH ELECTRONIC CENTERS

For your convenience, "over the counter" replacement parts are available from the Heath Electronic Centers listed in your catalog. Be sure to bring in the original part and purchase invoice when you request a warranty replacement from a Heath Electronic Center.

TECHNICAL CONSULTATION

Need help with your kit? — Self-Service? — Construction? — Operation? — Call or write for assistance. you'll find our Technical Consultants eager to help with just about any technical problem except "customizing" for unique applications.

The effectiveness of our consultation service depends on the information you furnish. Be sure to tell us:

- The Model number and Series number from the blue and white label.
- The date of purchase.
- An exact description of the difficulty.
- Everything you have done in attempting to correct the problem.

Also include switch positions, connections to other units, operating procedures, voltage readings, and any other information you think might be helpful.

Please do not send parts for testing, unless this is specifically requested by our Consultants.

Hints: Telephone traffic is lightest at midweek — please be sure your Manual and notes are on hand when you call.

Heathkit Electronic Center facilities are also available for telephone or "walk-in" personal assistance.

REPAIR SERVICE

Service facilities are available, if they are needed, to repair your completed kit. (Kits that have been modified, soldered with paste flux or acid core solder, cannot be accepted for repair.)

If it is convenient, personally deliver your kit to a Heathkit Electronic Center. For warranty parts replacement, supply a copy of the invoice or sales slip.

If you prefer to ship your kit to the factory, attach a letter containing the following information directly to the unit:

- Your name and address.
- Date of purchase and invoice number.
- Copies of all correspondence relevant to the service of the kit.
- A brief description of the difficulty.
- Authorization to return your kit COD for the service and shipping charges. (This will reduce the possibility of delay.)

Check the equipment to see that all screws and parts are secured. (Do not include any wooden cabinets or color television picture tubes, as these are easily damaged in shipment. Do not include the kit Manual.) Place the equipment in a strong carton with at least THREE INCHES of *resilient* packing material (shredded paper, excelsior, etc.) on all sides. Use additional packing material where there are protrusions (control sticks, large knobs, etc.). If the unit weighs over 15 lbs., place this carton in another one with 3/4" of packing material between the two.

Seal the carton with reinforced gummed tape, tie it with a strong cord, and mark it "Fragile" on at least two sides. Remember, the carrier will not accept liability for shipping damage if the unit is insufficiently packed. Ship by prepaid express, United Parcel Service, or insured Parcel Post to:

Heath Company
Service Department
Benton Harbor, Michigan 49022

HEATH

Schlumberger

MP MASTER

MA22790

HEATH COMPANY • BENTON HARBOR, MICHIGAN

THE WORLD'S FINEST ELECTRONIC EQUIPMENT IN KIT FORM

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